



Mechanical pretreatment of municipal solid waste for co-digestion in wastewater treatment plants

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1. Background and objective

- About 1/3 of the unsorted municipal solid household waste (MSW) consists of biodegradable material^[1].
- Most of the biodegradable material of the MSW is concentrated in the low calorific fraction (LCF, <40 mm)^[2].
- The biodegradable material, if separated from the MSW, could be used for co-digestion in wastewater treatment plants (WWTPs).
- The objective was to produce a biodegradable-rich and low in inerts co-substrate (CoS) derived from the LCF. The CoS should be suitable for co-digestion in WWTPs.

2. Material and methods

- Development of a pretreatment process (Fig. 1) to produce a pumpable material to be fed to the hydrocyclone for heavy particles removal.
- Thickening of the CoS by gravity.
- Performance of co-digestion trials with primary sludge (PS) and waste activated sludge (WAS) in laboratory scale using continuous stirred tank reactors.
- Analysis of the dewatering efficiency of the ensuing digestate.

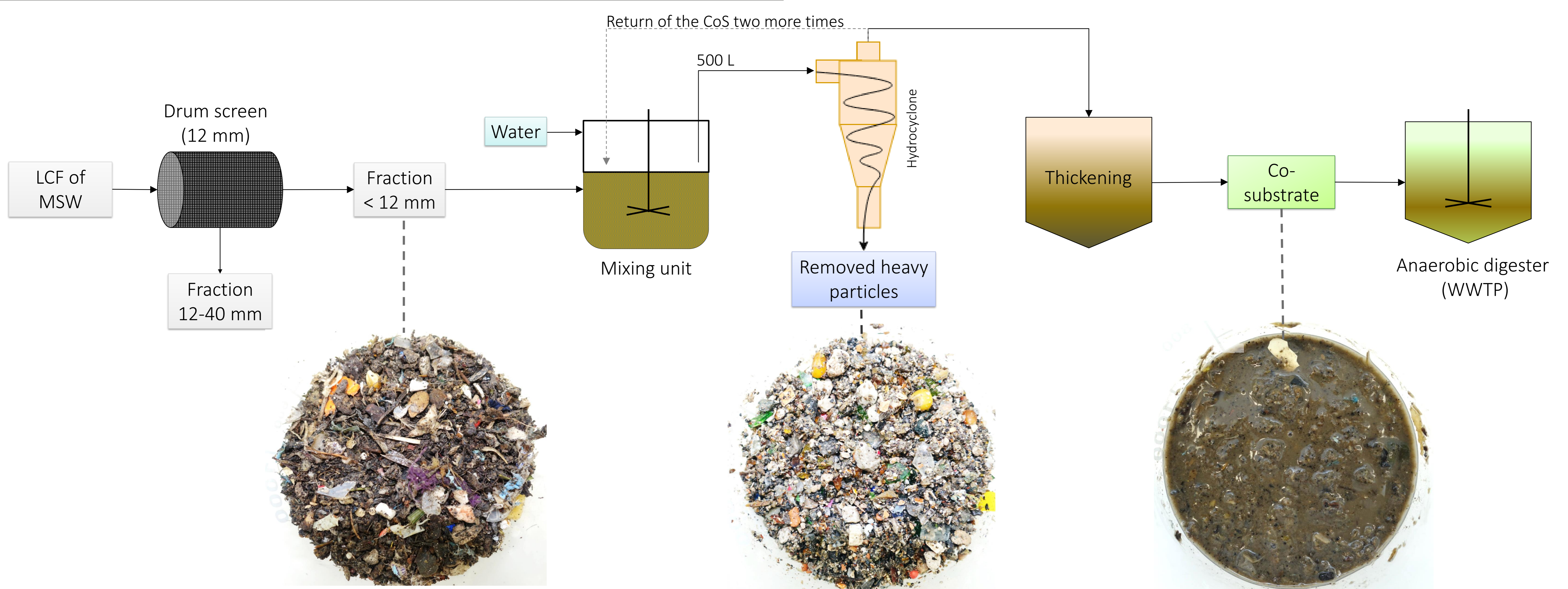


Fig. 1: Configuration for the pretreatment of the LCF of the MSW for the anaerobic co-digestion at WWTPs.

3. Preliminary results

- Increase of the biodegradable material by 62% after running the hydrocyclone three times^[3] (Fig. 2).
- Stable anaerobic co-digestion of the CoS with PS and WAS during 8 weeks in the laboratory experiments.
- Methane production by the CoS was 239 m³_N/t VS.
- Increased dewatering efficiency of the ensuing digestate in 4.8% compared to the mono-digestion of sewage sludges.

4. Preliminary conclusions

- Production of an additional substrate to be locally used for biomethane production.
- Separated heavy fraction can be further processed (e.g. by optical sorting) for recycling of glass shards.
- Detailed examination of micropollutants present in the CoS is necessary.

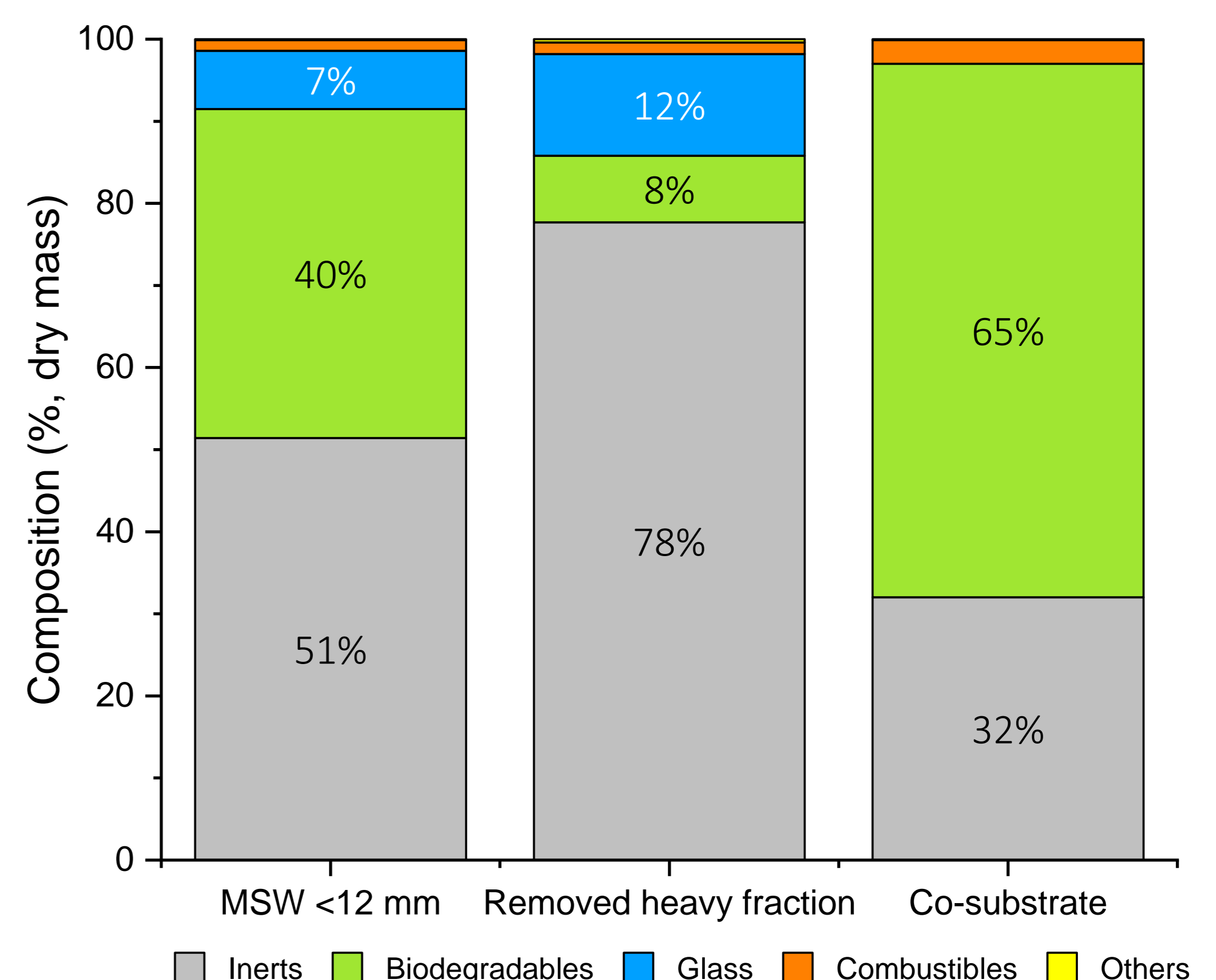


Fig. 2: Composition of the MSW derived fraction before and after the pretreatment. Values ≤3% not presented.

References

- ^[1] BMK, 2020. Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie. Die Bestandsaufnahme der Abfallwirtschaft in Österreich, Referenzjahr 2018, Vienna.
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- ^[3] Lopes, A. C. P., Senfter, T., Ebner, C., Senn, M., Pillei, M., Kraxner, M., Robra, S., Bockreis, A. Separation of biodegradable material from the low calorific fraction of municipal solid waste (submitted to Journal of Cleaner Production – under review).

Acknowledgments

- Austrian Academy of Sciences for a DOC Fellowship at the Institute of Infrastructure, University of Innsbruck.
- Abfallbehandlung Ahrental GmbH for financial support and rich discussions.
- MCI for project cooperation and development of the hydrocyclone (Thomas Senfter, Martin Pillei, Mathias Senn and Michael Kraxner).
- Sabine Robra and Christian Ebner for project guidance.
- Frédéric Gerke, Marco Wehner and Carolina Kinzel for laboratory support.