



Optimisation of fermentation and extraction for production of Medium Chain Fatty Acids (MCFA)

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MCFA as chemical building blocks

Bio-refineries...

- ...sustainably produce materials, fuels and energy
- ...reduce fossil fuel dependency
- ...recover nutrients & carbon present in (agro)-industrial wastestreams

Chain Elongation:

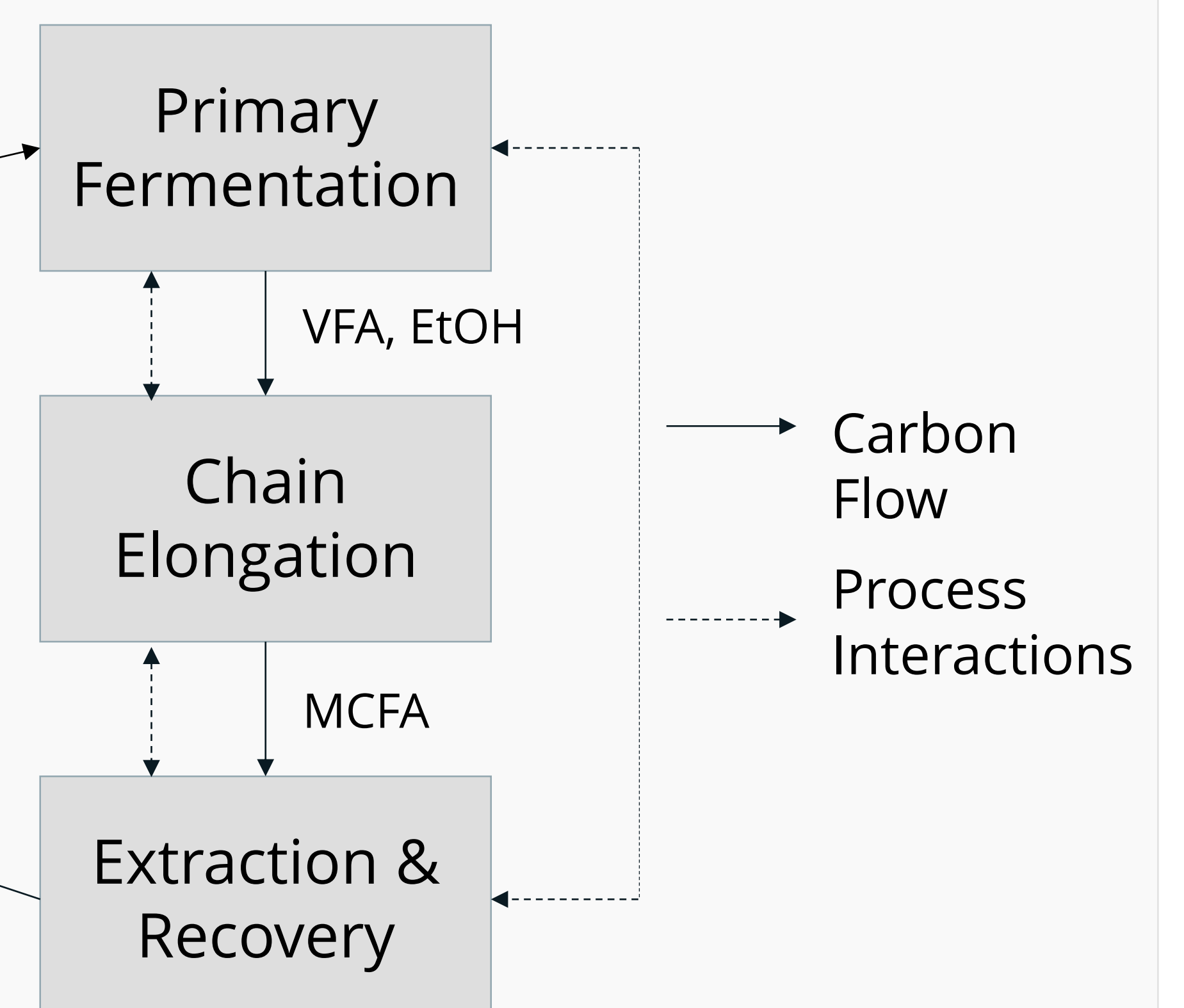
Condensation of Volatile Fatty Acids (VFA, e.g. Acetic acid) with EtOH to Medium Chain Fatty Acids (MCFA)

Extraction & Recovery:

Separation of the target product from the broth to recover the MCFA

MCFA...

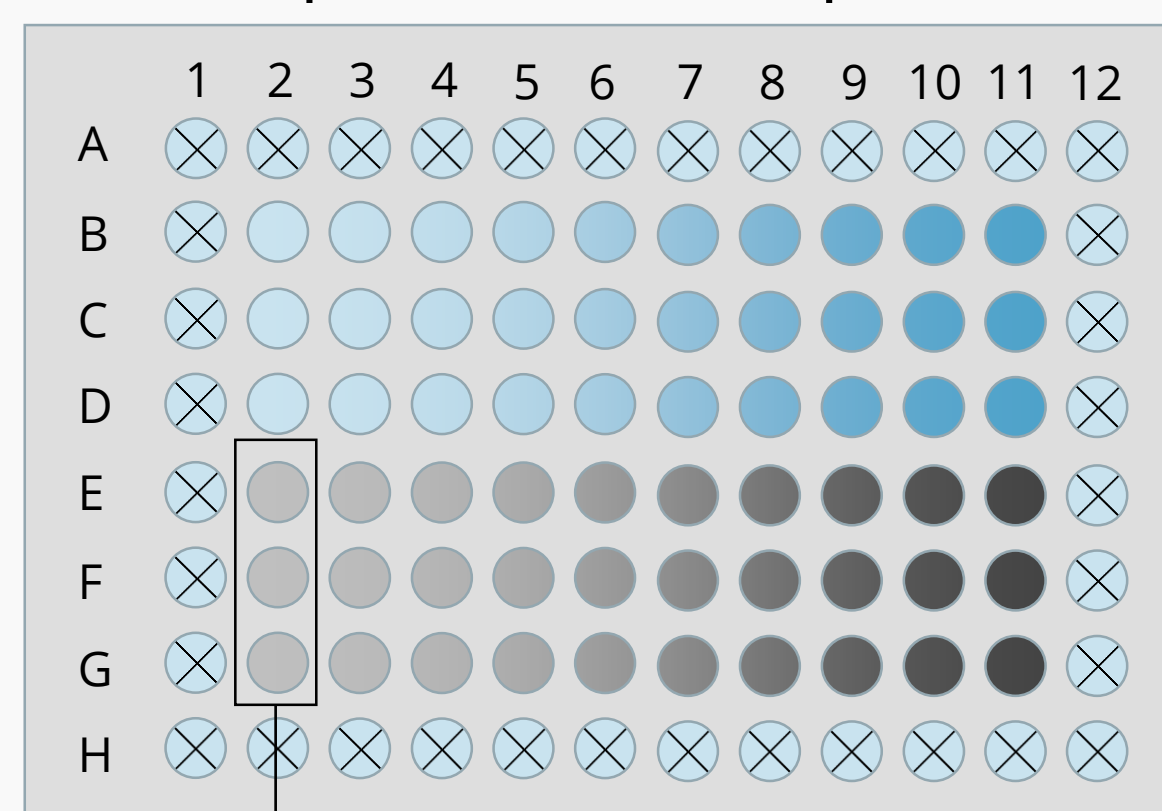
- ... include Caproic acid (C6), Caprylic acid (C8), Capric acid (C10) & Lauric acid (C12)
- ... can be used as antimicrobial agents in feedstocks
- ... are precursors for solvents, fuels and other chemicals



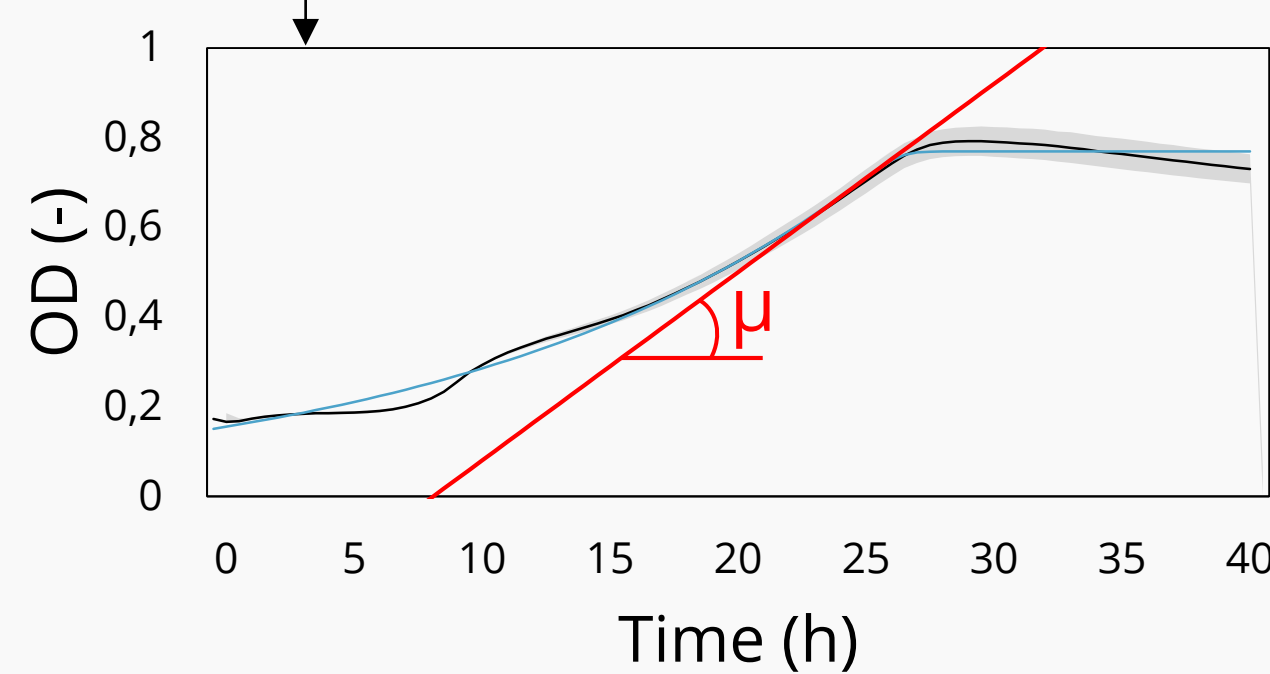
Modelling of MCFA-production

Pure Chain Elongating culture: *C. kluyveri*

96-well plate kinetic experiments

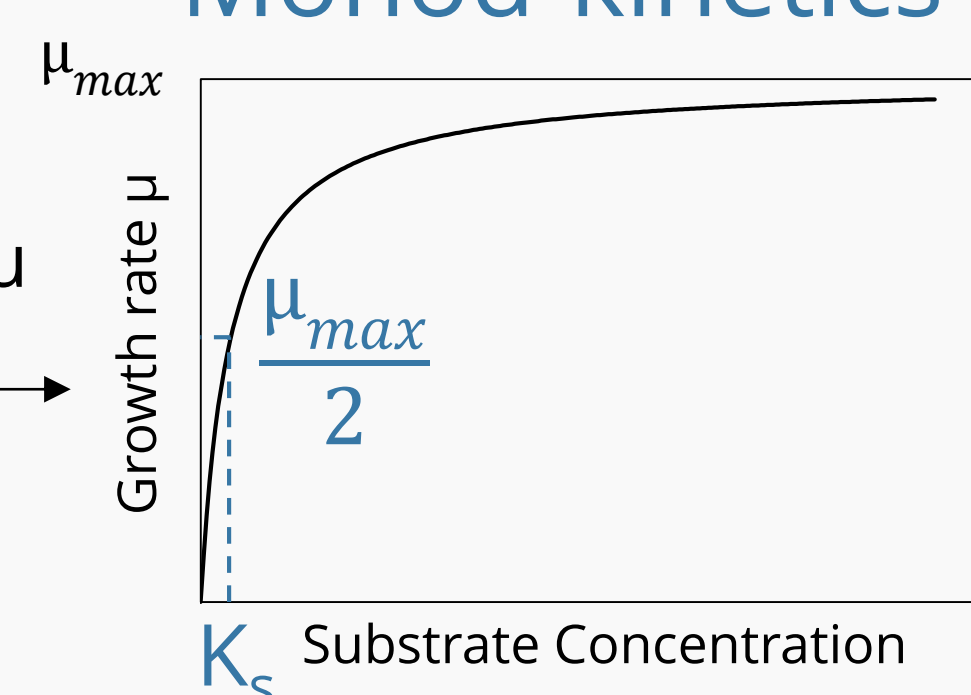


Varying substrates & concentrations



Different μ

Monod-kinetics



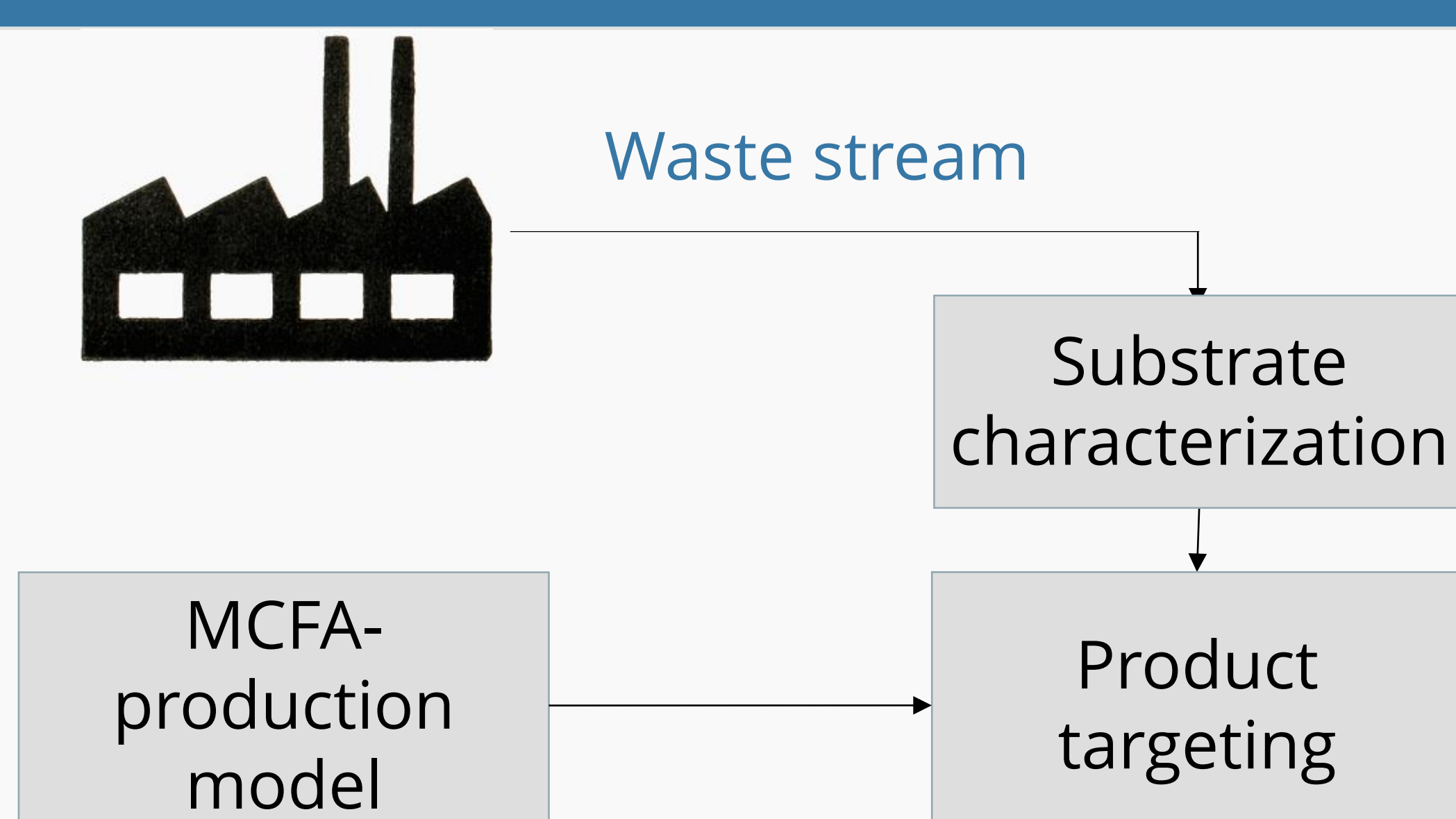
Parameter estimation: Y, K_s, etc.

Kinetic mass balance model

Undefined Community Capable of Chain Elongation

St.Dev. — M. elsdenii - PYG-medium — Model Fit

Application to real streams



Combining the knowledge of what is in a waste stream with what is possible allows targeting the optimal product for carbon-recovery

Optimal recovery of carbon in waste stream

Acknowledgements



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