# MICROBIAL SYNGAS CONVERSION BY MESOPHILIC AND THERMOPHILIC ANAEROBIC MIXED-CULTURES

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Syngas (synthesis gas) is produced during the gasification of different materials, e.g. coal, oil and natural gas, tar sands, recalcitrant wastes, lignocellulosic biomass. Syngas is composed of mainly $H_2$, CO and $CO_2$ and can be used in biological processes for the production of fuels or usable chemicals. The aim of this work was to study the physiology and microbial composition of anaerobic cultures able to utilize syngas. Mesophilic (37ºC) and thermophilic (55ºC) enrichment experiments were performed with syngas mixtures as sole carbon and energy sources; CO was used at different final partial pressures ranging from 5% to 45% (total pressure $1.75\times10^5$ Pa). Different anaerobic sludges were used as inocula. During incubation, headspace composition was analyzed by GC and fatty-acids and alcohols present in the liquid by HPLC. Cultures were subsequently transferred to fresh medium once CO was completely used. Microbial community changes in the enrichment series were monitored by 16S rRNA-based techniques (PCR-DGGE). Microorganisms present in stable enrichments were identified by cloning and sequencing. Under mesophilic conditions, CO could not be used at partial pressures higher than 10%. However, thermophilic enrichment cultures could convert CO at partial pressures up to 45%. Methane could not be detected and acetate and hydrogen were the main products formed in stable enrichment cultures. A stable thermophilic enriched culture was obtained consisting of three predominant microorganisms closely related to *Thermincola*, *Desulfotomaculum* and *Thermoanaerobacterium* species. No archaea could be detected. Isolation of these bacteria is ongoing and their physiology regarding CO conversion will be further studied.

*Acknowledgments: The financial support from Fundação para a Ciência e Tecnologia (FCT) and European Social Fund (POPH-QREN) trough PhD grant SFRH/BD/48965/2008 given to Joana Alves is gratefully acknowledged.*