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**ENRICHMENT STRATEGIES FOR POLYHYDROXYALKANOTAES (PHA) PRODUCTION FROM FERMENTED CRUDE GLYCEROL USING MICROBIAL MIXED CULTURES**

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Polyhydroxyalkanoates (PHA) are biopolymers produced as internal carbon storage in bacteria. They are a potential alternative to petroleum derived plastics, although their competitiveness is still limited by their productions costs. These could be lowered by the use of waste substrates - such as crude glycerol, a major by-product of the biodiesel industry- and microbial mixed cultures - which do not require sterilisation [1].

An important limitation for the PHA production from glycerol is the side accumulation of glycogen, a polymer with no market value. This can be circumvented by submitting first the substrate to anaerobic fermentation to produce volatile fatty acids (VFA), which are preferred substrates for PHA production[2]. However, the fermentation also leads to 1,3-propanediol (1,3-PDO), a compound not previously described for PHA production.

Initial experiments aimed at the transformation of both VFA and 1,3-PDO to PHA. Using the classical feast-famine enrichment strategy, PHA production from 1,3-PDO was not observed. Conversely, the transformation was achieved by using a new strategy that limited the nitrogen during the feast phase. Nevertheless, the PHA yield obtained form 1,3-PDO was very low compared to the one obtained from VFA (0.24 vs 0.74 Cmol PHA/Cmol S).

Given that 1,3-PDO is also a high value product, a third enrichment strategy was applied where only VFA were converted into PHA (up to 70% of the cells dry matter with a yield of 0.9 Cmol PHA/Cmol S) and 1,3-PDO was recovered from the process (97% recovery) in a biorefinery scheme. This strategy, based on the development of substrate preferences in mixed cultures, has the potential of being applied in other downstream processes of biological conversions, where fermentation side-products could be transformed into a high value product (PHA).

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