

PROCESS FOR CONVERTING WASTE, EFFLUENTS AND ORGANIC BY-PRODUCTS IN RECYCLABLE MATERIALS



TECHNOLOGY SUMMARY

Biological process to treat waste, effluents and organic by-products with industrial origin characterized by high biodegradability. This process adds value to conventional biological treatment processes, integrating their assumptions on the concept of biorefinery, simultaneously allowing reducing and eliminating organic matter and incorporating organic components in added-value materials (lipids, gases with energetic potential, volatile organic acids and polyhydroxyalkanoates (PHA), instead of discharging as primary products to the environment. The invention aims to reduce by 96% the organic matter content of the starting substrate allowing generally meet the discharge criteria set out in the legislation.

BENEFITS

MATERIAL AND ENERGETIC VALORIZATION: integrated biorefinery and treatment concept.

LOW-COST PHA PRODUCTION, using mixed substrates and operated under non-sterile conditions.

FRAMED IN CIRCULAR ECONOMY CONCEPT: recycling of carbon, nitrogen and phosphorus.

HIGH OPERATIONAL ROBUSTNESS to organic load shocks and seasonality of production and composition of organic substrates.

LOW IMPLEMENTATION COMPLEXITY

CONTEXT

The present technology intends to solve organic pollution problems through a change in the conventional biological treatment. This process consists in a series of stages in biological reactors operated with mixed cultures in non-sterile conditions, allowing valorizing residues, effluents and organic by-products through the production of chemical precursors (volatile organic acids) and of biodegradable polymers like polyhydroxyalkanoates (PHA). Additionally, energetically recoverable materials (methane, hydrogen and lipids usable in biodiesel production) are produced, and the gas streams generated with potential greenhouse effect (CO₂) are largely sequestered by the process itself, simultaneously with the nitrogen and phosphorus that may be present in the substrates. This invention allows to handle the hydroxyvalerate content of the copolymer produced by manipulating the composition of the substrates during the acidogenic stage. In addition, the microbial culture selection strategy presented in this invention allows to obtain a culture with a high polymer accumulation capacity, robust and well adapted to organic loading shocks and seasonal variations in substrate compositions.

APPLICATIONS

The technology can be used in waste water treatment plants for treatment of residues, effluents and organic by-products of:

URBAN RESIDUES

AGROFOOD AND BIOPLASTICS INDUSTRIES

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IP RIGHTS

National patent granted.

DEVELOPMENT STAGE

TRL 4 – technology in prototype phase, already tested in the laboratory.

KEYWORDS

RESIDUES VALORIZATION

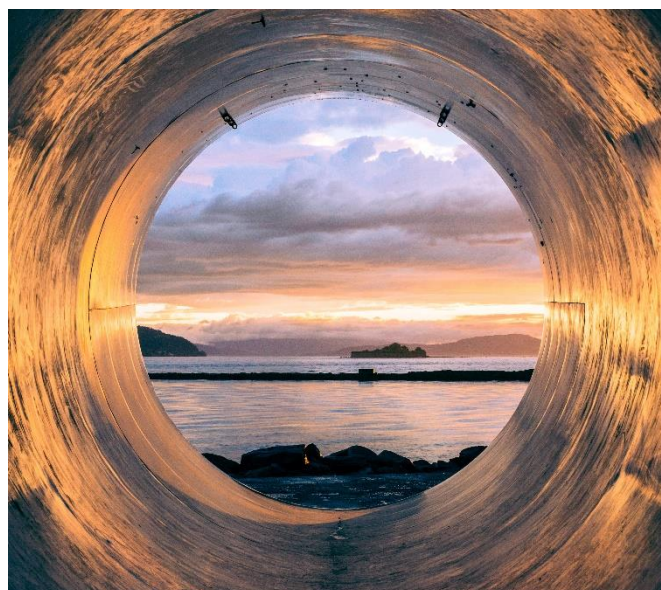
BIOREFINERY

ANAEROBIC ACIDIFICATION

VOLATILE ORGANIC ACIDS

POLYHYDROXYALKANOATES (PHA)

MIXED MICROBIAL CULTURES



DEVELOPED BY

Researchers of Centre for Environmental and Marine Studies (CESAM) and of Aveiro Institute of Materials (CICECO) from the University of Aveiro.

BUSINESS OPPORTUNITY

Licensing agreement.

Joint further development.

Adaptation to specific needs.

Testing of new applications.

PARTNERSHIP

The University of Aveiro seeks partners in transformation industries with high production of organic residues and companies which operate in the field of urban and industrial waste treatment.

CONTACT

University of Aveiro
UATEC – Unidade de Transferência de Tecnologia
Edifício do Departamento de Educação e Psicologia
Campus Universitário de Santiago
3810-193 Aveiro | Portugal

tel: +351 234 370 887
fax: +351 234 370 089
e-mail: uatec@ua.pt
web: www.ua.pt/uatec

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