

**CORK BOILING WASTEWATER ANAEROBIC DIGESTION PROCESS LEADS TO BIOGAS AND VALUABLE ENZYMES PRODUCTION.**

Marques, Isabel Paula [1], Gil, Luis [2], La Cara, Francesco [3][a]

[1] Laboratório Nacional de Energia e Geologia, I.P., Lisboa, Portugal.

[2] Laboratório Nacional de Energia e Geologia, I.P., Lisboa, Portugal.

[3] Istituto di Biochimica delle Proteine, CNR, Napoli, Italy.

[a] [f.lacara@ibp.cnr.it](mailto:f.lacara@ibp.cnr.it)

**ABSTRACT**

Cork is the outer bark of the cork-tree (*Quercus suber* L.) and it is a very important industrial sector in western Mediterranean region, being Portugal the world-leading producer and exporter (1).

The anaerobic digestion has never been applied to the treatment and valorization of the industrial cork effluents (cork boiling wastewater, CBW). The goal of the present work is evaluate the role of this biological process in providing valuable biomolecules, i.e. enzymes, during the conversion of CBW.

Anaerobic experiments were conducted under mesophilic conditions of temperature and the obtained results suggest that CBW is an interesting substrate to be treated and valorised through the anaerobic digestion.

Besides the energy recovery through biogas production by anaerobic digestion of CBW, the increase in the reactor effluent of valuable biomolecules is an aspect of great industrial interest. The identification and characterization of such products of high added value creates a supplementary prospect of effluent valorisation, contributing to the cork sector profits.

During the CBW anaerobic digestion process several important alterations on the enzymatic capacity of the digested flow were observed. For instance, the laccase activity contained in the CBW was implemented by anaerobiosis and the xylanase was formed during the process. Laccases exhibit low substrate specificity and can be used in different industrial sectors (i.e. paper manufacturing, wine stabilization and wastewater treatment) (2). Xylanases are enzymes involved in the hydrolyse carbohydrates and are used in the pulp, paper and food industries (3). The production of enzymes with commercial interest offers an additional opportunity for the biotechnological valorisation of the CBW, contributing to make the process more interesting and cheaper.

**References**

(1) H. Pereira. The cork oak, Cork, Elsevier Science B.V., Amsterdam, 2007, pp. 103-125.

(2) M. Imran, M.J. Asad, S.H. Hadri and S. Mehmood (2012). Production and industrial applications of laccase enzyme. *Journal of Cell and Molecular Biology* 10(1): 1-11.

(3) A.D. Harris and C. Ramalingam (2010). Xylanases and its application in Food Industry: a Review. *Journal of Experimental Sciences* 1(7): 1-11.

[-] Enzymes; anaerobic digestion; biogas; cork boiling wastewater