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## COMPARISON OF OZONATION AND FUNGAL TREATMENT FOR THE DEPURATION OF AN ANAEROBICALLY PRETREATED MEZCAL VINASSE

Vania Robles-González<sup>1,2</sup>, Nora Ruiz-Ordaz<sup>1</sup>, Juvencio Galíndez-Mayer<sup>1</sup>,  
Noemí Rinderknecht-Seijas<sup>3</sup>, Héctor M. Poggi-Varaldo<sup>4\*</sup>

<sup>1</sup>ENCB del IPN, Mexico ; <sup>2</sup>Universidad Tecnológica de la Mixteca, México; <sup>3</sup>ESIQIE del IPN, Div. Ciencias Básicas, México

<sup>4</sup>Environmental Biotechnology and Renewable Energies R&D Group, Depto. de Biotecnología y Bioingeniería, Dept. Biotechnology and Bioengineering, CINVESTAV-I.P.N, México, e-mail : hectorpoggi2001@gmail.com

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### Abstract

In Mexico, the manufacturing of mezcal generates huge amounts of mezcal vinasses (MV), that cause a negative environmental impact. Although there is no specific information for mezcal vinasses, similar effluents have been treated by anaerobic digestion (AnD) usually complemented by oxidative chemical post-treatments such as ozonation. In the present work the post-treatment of anaerobically pretreated MVs by batch ozonation and fungal treatment using special pellets of the ligninolytic fungus *Trametes versicolor* were evaluated.

Anaerobically pretreated mezcal vinasses (AP-MV) (Robles-González et al., 2012 b) were subjected to two posttreatment processes: ozonation and fungal treatment using pellets of *Trametes versicolor* in a mixture of sawdust and activated carbon (hybrid or triple pellets). The batch ozonation was performed for 30, 60, 90, and 120 minutes using AP-MV without dilution (COD<sub>0</sub>=26.7 gO<sub>2</sub>/L). Batch fungal post-treatment with hybrid pellets was carried out with AP-MV diluted with tap water to a concentration of organic matter of 4.14 gO<sub>2</sub>/L. Wastewater analyses were performed according to Standard Methods (APHA, 1998); total aromatics compounds (TAC) and total phenolic contents were determined as described in literature.

Removal efficiencies of organic matter in the ozonation process were low. The concentration of phenolic compounds decreased below the limit of quantification (20 mg gallic acid/L), after 30 minutes of treatment. The total removal of aromatic compounds was moderate and the values ranged from 15 to 31%. The post-treatment with ozone was very effective in removing color (74 to 80%). On the other hand, fungal post-treatment achieved higher net removal efficiencies of COD than ozonation. However, the efficiencies of color and total aromatic compounds removals were lower. The overall removal efficiency of AnD followed by fungal posttreatment was 88.9%, significantly higher than that obtained with the combination AnD plus ozonation (60 min), which was 76.2%.

Our results show that fungal post-treatment with ligninolytic fungi was more efficient than post-treatment with ozone in terms of organic matter removal (COD). This could represent an economic advantage in the treatment of effluents with a high content of recalcitrant compounds as in the case of mezcal vinasse. Some authors post-treated vinasses from beet molasses by ozonation, after conventional biological treatment; they observed COD and colour removals of 13% and 76% at 30 min of ozonation, similar to our results. There are no studies on anaerobic treatment of mezcal vinasses followed by post-treatment with ligninolytic fungi. So, our results will be discussed in terms of studies conducted with other recalcitrant effluents. Our COD removal efficiencies in the fungal post-treatment were higher than those reported in literature in assays of post-treatment of anaerobic weak black liquor using *T. versicolor* who observed moderate removals (32 to 71%).

**Key words:** anaerobic digestion, fungal treatment, mezcal vinasses, ozonation

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