



POLYVINYL ACETATE DEGRADATION BY YEASTS ISOLATED FROM PAPER RECYCLED INDUSTRY IN CHIHUAHUA MEXICO.

José Peregrina², Lourdes Ballinas-Casarrubias¹, Claudia Saenz¹, Anahí Levario¹, J. Daniel Caro¹, Marco Sanchez², Guillermo Mendoza², Juan Meneses², Eduardo Duarte², G. Virginia Nevárez-Moorillón¹, ¹Facultad de Ciencias Químicas Universidad Autónoma de Chihuahua. Chihuahua, Chihuahua; ²COPAMEX, México.
josedanielcaro@gmail.com

Key words: paper-industry, polyvinylacetate, degradation

Introduction. In the Kraft paper production from fiber board, there is a persistent contamination due to the presence of some hydrophobic polymers with adhesive behavior, known as stickies [1]. The effectiveness of paper production thus, is seriously affected. Several processes have been developed to diminish their presence [2]. recent reports on the use of enzymes to hydrolyze some of the principal compounds of these pollutants, such as polyvinylacetate (PVAc), are promising for stickie control [3]. Direct biodegradation of these compounds could be affordable and represents a cheap and environmental friendly approach [4]. Particularly, for stickie depletion, there is no current report using endogenous microorganisms from paper production environment.

In this work, some yeasts isolated from the paper factory, were used for PVAc degradation. These results were further used for a new proposal in stickie control during paper production.

Methods. Into the paper factory, Stickies and water samples were inoculated in M9 (salt enriched) media under agitation for 7 days. After that, they were transferred to the following media: M9, M9+ 0.1% yeast extract and M9+0.2% glucose; and incubated under agitation at 25° C for 4 days. For isolation of pure culture, samples were plated into YM plates conformed of 1% glucose; 0,3% malta extract; 0,3% yeast extract; 0,5% peptone agar plates and incubated at room temperature for 2 days. Pure cultures were obtained from the inoculated plates and they were preliminary identified using methylene blue. Selective media were used for screening of pure isolates for PVAc degradation, using the following media: M9, Baird Parker and tributiryn media stained with methylene blue.

Results. From all 6 water samples and 12 stickies obtained from diverse sampling points into the factory, a total of 12 yeast strains were isolated. By the tests performed, all strains were selected presenting lipase activity for polyvinyl acetate degradation. These yeasts were initially identified as belonging to the *Rhodotorulas* genus (Fig. 1).

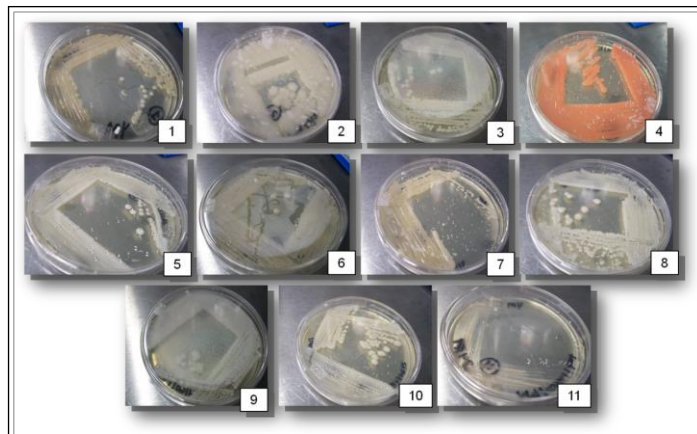


Figure 1. Yeasts isolated from the paper factory presenting lipase activity.

Conclusions. In conclusion, yeast isolated from the paper production process are adequate for polyvinyl acetate degradation, as one of the main components in stickie samples.

Acknowledgements. Authors are in debt to COPAMEX and Conacyt-PROINNOVA.

References.

1. Miranda, R. Balea, A. Blanca, ES. Carrillo, I. Blanco, A. (2008) Identification of recalcitrant stickies and their sources in newsprint production. *Ind. Eng. Chem*; 47, pp. 6239-6250
2. Barba, V. Prieto, A. Martínez, MJ. (2013) Potential of *Ophiostoma piceae* sterol esterase for biotechnologically relevant hydrolysis reactions. *Bioeng. Landes Biosc.* 4:4, pp. 1–5.
3. Ronkvist, A. Lu, W. Feder, D. and Gross R. (2009). Cutinase-Catalyzed Deacetylation of Poly (vinyl acetate). *Macromol.* 42: 6086–6097
4. S. Chattopadhyay, G. Madras, (2003), *J. of App. Polymer Sci.*, Vol. 89: 2579-2582