



“Gheorghe Asachi” Technical University of Iasi, Romania



---

## CACTUS JUICE PREPARATIONS AS BIOFLOCCULANT: PROPERTIES, CHARACTERISTICS AND APPLICATION

Moncef Khadhraoui<sup>1</sup>, Mohamed Sellami<sup>2</sup>, Zied Zarai<sup>2</sup>, Kamel Saleh<sup>3</sup>,  
Faouzi Ben Rebah<sup>4\*</sup>, Roland Leduc<sup>5</sup>

<sup>1</sup>Laboratoire 3E (Eau, Energie, Environnement), ENIS, Sfax, Tunisia

<sup>2</sup>Laboratoire de Biochimie et de Génie Enzymatique des Lipases LBGE, ENIS, Sfax, Tunisia

<sup>3</sup>Department of Biology, College of Science, King Khalid University, P. O. Box 9004, Abha 61413, Kingdom of Saudi Arabia

<sup>4</sup>Department of Chemistry, College of Science, King Khalid University, P. O. Box 9004, Abha 61413, Kingdom of Saudi Arabia

<sup>5</sup>Department of Civil Engineering, University of Sherbrooke, Sherbrooke (Québec), Canada J1K 2R1

---

### Abstract

In this study, the flocculating properties of different cactus juice preparations were assessed using synthetic and real industrial and leachate wastewaters. It was found that the crude CJ had a flocculating activity (FA) of  $89 \pm 2.2\%$  which is significantly higher than that of a powdery sample derived from a  $60^\circ\text{C}$  oven-dried CJ sample and which was about  $37.8 \pm 2.5\%$ . Interestingly, both crude and dried samples showed the ability to flocculate kaolin suspensions within a wide pH range from 3 to 11. The flocculating activity was found to increase with the presence of divalent and trivalent cations. The enhancement is more significant in the case of the  $60^\circ\text{C}$  oven-dried sample. Crude bioflocculant showed to be thermally stable. Both crude and dried CJ removed COD in petrochemical and leachate wastewaters at efficiencies of  $72 \pm 2.5\%$  (with crude CJ),  $69 \pm 3.0\%$  (with dried CJ),  $88 \pm 2.5\%$  (with crude CJ) and  $82 \pm 2.7\%$  (with dried CJ), respectively. Flocculation reduced also the SS by  $85 \pm 3.0\%$  (with crude CJ),  $75 \pm 1.5\%$  (with dried CJ),  $91 \pm 2.0\%$  (with crude CJ) and  $85 \pm 1.7\%$  (with dried CJ), respectively for petrochemical and leachate wastewaters. The removal efficiency of an emerging pollutant (naproxen) from the kaolin suspension, did not exceed 32%. Physico-chemical analysis revealed that the bioflocculant is mainly composed of polysaccharide. Nevertheless, the elemental composition and the microstructure of the samples, obtained by SEM, may explain the variability of the flocculating activity of the CJ preparation.

**Keywords:** bioflocculant, cactus juice, emerging pollutant, flocculating activity, naproxen, opuntia

*Received: February, 2015; Revised final: May, 2015; Accepted: May, 2015; Published in final edited form: January, 2019*

---

\* Author to whom all correspondence should be addressed: e-mail: [benrebahf@yahoo.fr](mailto:benrebahf@yahoo.fr)