BUENOS AIRES 2023
JUNE 4 - 8

WCCE11 - 11TH WORLD CONGRESS OF CHEMICAL ENGINEERING

IACCHE - XXX INTERAMERICAN CONGRESS OF CHEMICAL ENGINEERING
CAIQ2023 - XI ARGENTINIAN CONGRESS OF CHEMICAL ENGINEERING
CIBIQ2023 - 2nd IBEROAMERICAN CONGRESS OF CHEMICAL ENGINEERING

Buenos Aires - Argentina - June 4-8, 2023

"The global engineering working for a better future world"

Proceedings of

WCCE11 – 11th World Congress of Chemical Engineering

Book of Abstracts

Publisher:
Asociación Argentina de Ingenieros Químicos
President / Publisher: Oscar Pagola
Maipú 726 – 1º A –
(1006) – Ciudad Autónoma de Buenos Aires – Argentina

Organized by:
ASOCIACIÓN ARGENTINA DE INGENIEROS QUÍMICOS
Centro para la Seguridad de los Procesos Químicos

Promoted and supported by:
WCEC World Chemical Engineering Council

World Congress of Chemical Engineering - ISSN 2953-5565

Introduction

We are very pleased to present the Proceedings of WCCE11 and its associated events. It has been a great honor for us to receive the number of papers presented, which, due to their high level, contributed to increase the prestige to the WCCE11.

Not only the papers, but also the plenary and thematic conferences presented, covered innovative topics and aspects in the different areas of Chemical Engineering, thus contributing to the solution of the great challenges that humanity must face in a context of global population growth, natural resources scarcity and the climate challenges brought about by human activities.

This 11th World Congress took place at the UCA Convention Center. The Center has very good facilities, which became perfectly adequate to host the event. WCCE11 was developed in 14 rooms in parallel and in other areas where all the activities took place.

Because of the pandemics, we faced a very difficult and complex situation, but after great efforts, it became possible to return to a face-to-face scheme, which represented an exceptional opportunity for researchers and specialists to meet in person, allowing them to have a very productive exchange of experiences.

Finally, we want to thank all those who made the WCCE11 possible. Our particular recognition to all the members of the different committees who allowed us to achieve and consolidate the success of this event

Oscar Pagola
Congress Chair

WCCE11 - 11th WORLD CONGRESS OF CHEMICAL ENGINEERING
IACCHE - XXX INTERAMERICAN CONGRESS OF CHEMICAL ENGINEERING
CAIQ2023 - XI ARGENTINIAN CONGRESS OF CHEMICAL ENGINEERING
CIBIQ2023 - II IBEROAMERICAN CONGRESS OF CHEMICAL ENGINEERING
Buenos Aires - Argentina - June 4-8, 2023
BUENOS AIRES 2023
JUNE 4 - 8
"The global chemical engineering working for a better future world"

Carboxymethylcellulose obtained from lignocellulosic waste and its use as a biopolymeric matrix

Cáceres, L.M. [1], Tourn, S.C. [1,2], Ruiz, C.R. [1], Sequeira, A.F. [1], Dagnino, E.P. [1,2]
1 Biological Organic Chemistry Research Center (FRRe, UTN)-Institute for Modeling and Technological Innovation (CONICET-UNNE). Resistencia, Chaco – Argentina
2 National Council for Scientific and Technical Research (CONICET), Godoy Cruz 2290 (C1425FQB) CABA – Argentina.

The increase in the rate of production and accumulation of solid waste and the search for sustainable environmental solutions imposes the need to introduce advanced technologies to manage it efficiently. In this context, this work aims to obtain carboxymethylcellulose (CMC) from lignocellulosic waste and later use it in the encapsulation of liquid smoke and essential oils. Thus, a product of higher value can be obtained from an abundant and readably available waste product of northeastern Argentina`s agroforestal industry. Rice husk samples for this research were provided by a local company. The rice husk was treated in a biorefinery scheme (Acid hydrolysis, 0.3% w/V, 150°C, 30 min; followed by organosolv treatment, NaOH-ethanol-water, 160°C, 60min, and alkaline treatment). Subsequently, CMC was obtained, esterifying the unbleached cellulose obtained from the mentioned raw material, using a modification of the Druvacell method. The unbleached cellulose is pretreated with isopropanol and sodium hydroxide to promote fiber swelling and ionization of hydroxyl groups, and subsequently esterification with monochloroacetic acid. On the other hand, bio-oil was obtained by pyrolysis, at 400 °C for 120 min, from exhausted *Schinopsis balansae* (quebracho colorado) sawdust and the water-soluble fraction produced was refined, representing 34.6% based on the residual biomass fed. Finally, the refined fraction was characterized, to identify the improvement and its quality as liquid smoke to be encapsulated.
The CMC obtained was used as a component, together with sodium alginate, of a biopolymeric matrix to encapsulate the water-soluble liquid smoke and hydrophobic essential oil. The raw material was characterized by determining its structural components, the substituent groups in CMC were recognized by FTIR and the degree of substitution was determined. In the production of microcapsules, using standard methods the performance and efficiency of the process were determined.
On the other hand, the post-treatment rice husk is composed of 94% cellulose, and the rest is lignin and remaining inorganics. From it, it was possible to obtain a crude CMC with a purity greater than 70% and a degree of substitution greater than 0.6. The microencapsulation results show average yields greater than 55% and efficiencies greater than 90% for both encapsulated substances.
With this work carried out, a very abundant residue could be valorized by obtaining CMC and using it in the microencapsulation of two chemically different substances. Good yields and efficiencies were obtained with liquid smoke [1] and essential oil [2], with comparable results with other authors.

Referencias

1. Xin, X., Essien, S., Dell, K., Woo, M. W., Baroutian, S. (2022). Effects of Spray-Drying and Freeze-Drying on Bioactive and Volatile Compounds of Smoke Powder Food Flavouring. *Food and Bioprocess Technology*, 15(4), 785-794.
2. Mahdi, A. A., Al-Maqtari, Q. A., Mohammed, J. K., Al-Ansi, W., Cui, H., Lin, L. (2021). Enhancement of antioxidant activity, antifungal activity, and oxidation stability of Citrus reticulata essential oil nanocapsules by clove and cinnamon essential oils. *Food Bioscience*, 43, 101226.