INNOVATIVE PROCEDURE TO OBTAIN CUTIN USING MICROWAVES

TECNOLOGÍA PATENTADA

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RESUMEN

The research group on **Polymers and Nanomaterials Analysis** has developed a new procedure for obtaining cutin from plant waste by microwave heating.

The new procedure has multiple advantages, such as higher efficiency, lower number of steps and a lower cost than existing procedures. In addition, it allows to obtain cutin with outstanding thermal stability.

The procedure is ideal for the recovery of a large number of vegetable wastes and can be applied by different industries.



INTRODUCCIÓN

The activity of the agri-food industry generates a large amount of waste that has a significant economic and environmental impact. However, many of these residues include very interesting active ingredients that can generate value through their extraction and application in other industries.

Cutin is one of these compounds with high added value. Cutin is a lipid polymer with multiple applications in the chemical, pharmaceutical, cosmetic and food industries. In addition, there are other compounds of great interest, such as antioxidants, water-soluble proteins and lignocellulosic material that can also be extracted and are very useful.

The extraction procedures that have existed so far involve different approaches, but all of them including a series of important stages and costs. The proposed procedure is developed more quickly by reducing the number of steps and also entails a reduction in costs.

DESCRIPCIÓN TÉCNICA

Cutin is a compound present in the extracellular membrane existing in most of the epidermal cells of the aerial parts of higher plants, that is, in leaves, fruits and non-woody stems, as well as in some bryophytes. Cutin represents between 40% and 80% in weight of this membrane.

The procedure proposed by the researchers for obtaining cutin from plant waste is based on extraction through microwave heating.

The **stages** of this extraction are as follows:

1. Milling of the vegetable waste.
2. Addition of an alkaline solution.

3. Microwave heating.

4. First physical separation of the supernatant from the solid.

5. Addition to the supernatant of an acid.

6. Maintenance of the solution obtained in the previous step for a period of time at constant temperature and precipitation of the cutin obtained.

7. Second physical separation of the cutin precipitate from the supernatant by centrifugation.

8. Optionally, a drying step can be performed to obtain dry cutin.

The cutin obtained is stable at temperatures above 200 ºC.

VENTAJAS Y ASPECTOS INNOVADORES

ADVANTAGES OF TECHNOLOGY

The advantages of the technology are as follows:

- Obtaining cutin at a lower cost by presenting lower energy requirements.
- Elimination of the previous degreasing stage, common in this type of extraction procedures, which generated a significant temporary and energy cost.
- Lower solvent consumption than in other procedures.
- Greater efficiency and protection of thermolabile components.
- High potential for scaling up the process at an industrial level.
- Development of a more sustainable process by allowing the use of organic acids such as citric acid.
- Obtaining cutin of a higher quality by presenting higher thermal stability.
- It facilitates the recovery of a large amount of vegetable waste.

INNOVATIVE ASPECTS OF TECHNOLOGY

The main novelty of the technology is the use of microwave heating to obtain cutin. The procedure allows to obtain a higher quality cutin with a more efficient, faster and more sustainable process.

This facilitates the exploitation of a wide variety of agri-food waste since it allows to obtain various substances of high value that can again be implemented by the industry.

ESTADO ACTUAL

The research group has optimized the extraction procedure obtaining a remarkable performance. The procedure has been implemented at the laboratory level and tested with multiple plant residues.

APLICACIONES DE LA OFERTA

This technology is very useful for the recovery of waste from the agri-food industry. It is therefore of interest to a wide range of companies.

It is interesting for agricultural companies and food producers that generate a high volume of vegetable waste. It is also interesting for waste management companies. Finally, it is also interesting for chemical companies specialized in the extraction of chemical compounds such as cutin, antioxidants and water-soluble proteins.

COLABORACIÓN BUSCADA

We are looking for companies interested in acquiring this technology for **commercial exploitation** through:

- Patent license agreements.
- R+D project agreement (technical cooperation) to undertake technology-related projects.

DERECHOS DE PROPIEDAD INTELECTUAL

This technology is protected by **patent application**.

- *Title of the patent: " Método para la obtención de cutina a partir de residuos vegetales y cutina obtenida ".*
- *Application number: P202230336*
- *Application date: April 13, 2022*

SECTORES DE APLICACIÓN (7)

Agri-food and Fisheries
Biology
Molecular Biology and Biotechnology
Pharmacology, Cosmetics and Ophthalmology
Materials and Nanotechnology
Medicine and Health
Chemical Technology

IMÁGENES TÉCNICAS (1)

