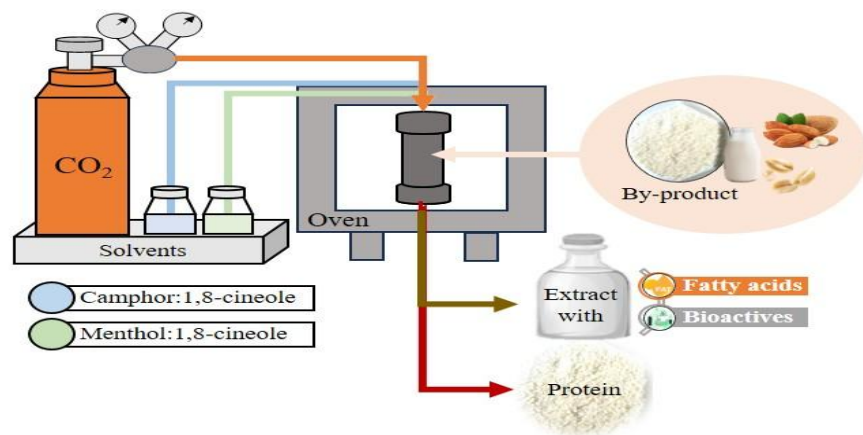


Technology Offer

CSIC/RN/001

## Utilization of almond and peanut vegetable beverage by-products using green solvents



**Design of a plant which uses supercritical CO<sub>2</sub> and eutectic mixtures applied to by-products from the almond and peanut beverage production process. Obtaining extracts rich in bioactive compounds and protein-rich extracts.**

### Intellectual Property

Priority patent application filed

### Stage of development

TRL5, development at pilot plant

### Intended Collaboration

Licensing and/or co-development

### Contact

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### Market need

Wastes from the production of almond and peanut beverages are a source of protein concentrates and bioactive hydrophobic compounds, but there is not a proposal for their valorization. Common extraction methods have limitations: cold pressing has low yields; the use of toxic organic solvents (like hexane) results in better yields but requires a solvent removal step; supercritical CO<sub>2</sub> extraction requires longer extraction times, and if ethanol is added as a cosolvent to enhance extraction, it must be removed at a later stage; enzymatic extraction improves extraction but is more expensive due to the use of enzymes.



### Proposed solution

Procedure that identifies green solvents with properties similar to hexane, used as cosolvents to accelerate the extraction process of hydrophobic compounds using supercritical CO<sub>2</sub>, applied to by-products from the manufacture of almond and peanut beverages.

Natural compounds have been combined to create eutectic mixtures which can be used directly in food or pharmaceutical mixtures, without the need to subsequently evaporate the solvent. Furthermore, by continuing this process using only supercritical CO<sub>2</sub>, the solvent is removed from the protein fraction remaining after the extraction of hydrophobic compounds, thus achieving a protein and hydrophobic fraction rich in bioactive compounds.

### Competitive advantages

- The biorefinery process allows the complete utilization (zero waste) of by-products, generating lipid fractions, proteins, and bioactive compounds, thus increasing the value of plant-based beverage manufacturing.
- The use of a green co-solvent increases process efficiency, requires less time, avoids an additional solvent evaporation step, is non-toxic and can be applied to food and pharmaceutical products.
- This process offers economic, operational, and environmental benefits.