

# METHOD FOR EXTRACTION AND RECOVERY OF ASTAXANTHIN FROM BIOMASSES

## KEYWORDS

- ❑ ASTAXANTHIN
- ❑ BIOMASS
- ❑ BIOSOURCED SOLVENT
- ❑ EXTRACTION
- ❑ RECOVERY

## AREA

- ❑ AGRIFOOD

## CONTACTS

- PHONE NUMBERS  
+39.06.49910888  
+39.06.49910855
- EMAIL  
u\_brevetti@uniroma1.it

### Priority Number

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### Patent Type

Patent for invention

### Ownership

Sapienza University of Rome 100%

### Inventors

Marco Bravi, Marco Scarsella, Vittoria Sapone.

### Industrial & Commercial Reference

nutraceuticals, feed (aquaculture), cosmetics, beverages.

### Time to Market

The invention was showed at the laboratory bench scale, with TRL 3.

### Availability

Licensing, Research, Development, Experimentation and Collaboration.



Fig. 1 Crustaceans shell contains astaxanthin.

### Abstract

The invention is designed to obtain the astaxanthin carotenoid from biomass by extraction from the matrix using a solvent consisting of a natural and non-toxic acidic substance. After extraction and in presence of water in a well-defined ratio, owing to the addition of a chemical trigger consisting in a well-defined quantity of an alkaline substance, astaxanthin is separated from the liquid as a sediment or as a floating material, depending on the substances used as a solvent and as a trigger factor.



Fig. 2 Astaxanthin separated at the end of the extraction process.



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SETTORE BREVETTI E TRASFERIMENTO TECNOLOGICO

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# METHOD FOR EXTRACTION AND RECOVERY OF ASTAXANTHIN FROM BIOMASSES

## Technical Description

The raw material containing astaxanthin (microorganisms or waste fractions from agri-food processing) is mixed with a solvent consisting of fatty acids of suitable chain length and kept under stirring until the matrix has been sufficiently exhausted. Subsequently, after having removed the remaining solid residue, the extract is added with a strong base of a suitable type and in suitable quantities, causing the formation of a red precipitate, which can be easily separated from the liquid by centrifugation and which constitutes, in this state, the astaxanthin product covered by the patent application.

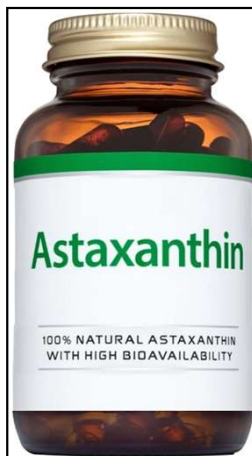


Fig. 3 Astaxanthin-based nutraceutical products.

## Technologies & Advantages

Techniques competing with the one illustrated have one or more of the following disadvantages with respect to that of the invention:

- They use toxic and / or flammable solvents (organic solvent extraction)
- They make use of inherently very expensive operations and extraction conditions (extraction with supercritical CO<sub>2</sub>)
- They require upstream pretreatments to overcome cell wall resistance and make astaxanthin accessible (all pretreatments that use solvents other than acidic, alkaline, ionic and invertible liquids)
- They do not allow to separate astaxanthin from the solvent after extraction (extraction with vegetable oils)



Fig. 4 The color of salmon is due to contained astaxanthin.

## Applications

The technology that has been developed can be used to obtain astaxanthin in solid, powder-like form, starting both from whole cells or pre-treated cells, and from agri-food waste such as those obtained from the processing of crustaceans and molluscs. The product obtained by separation from the extract according to the protocol described by the patent application does not contain extraneous biological fractions and, based on the degree of control of the supply chain that originated the raw material subjected to extraction, it can be used for the formulation of feed, cosmetic products, nutraceuticals, drugs. The product obtained from this process is not encapsulated.



Fig. 5 The Haematococcus pluvialis microalga.

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