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annatto-seed-extraction

Cruising Review

Extraction of Bixin from Annatto Seeds Using Supercritical Carbon Dioxide



This webpage QR code

Structured Data

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Annatto seeds are the product of the Achiote tree, grown primarily in the southern hemisphere. They are small, bright red, and contain the pigments bixin and norbixin. Bixin and norbixin are carotenoids that vary in tone between yellow and red ... used in cheeses, sausages, meats and candies

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PDF Version of the webpage (first pages)

<https://cruisingreview.com/smx/annatto-seed-extraction.html>

Extraction of Bixin from Annatto Seeds Using Supercritical Carbon Dioxide

- 1) Annatto seeds are the product of the Achiote tree, grown primarily in the southern hemisphere. They are small, bright red, and contain the pigments bixin and norbixin.
- 2) Bixin and norbixin are, quote – carotenoids that vary in tone between yellow and red ... used in cheeses, sausages, meats and candies – unquote.
- 3) There are three conventional means of extracting the pigments for use as natural colorants: quote – vegetable oil extraction, alkaline solution and organic solvent extraction – unquote.
- 4) Extraction with an organic solvent produces greater yields than vegetable oil extractions with, quote - concentrations, from 3.5 to 5.2 percent, being obtained – unquote.
- 5) The salt of norbixin is a water-soluble form of the pigment and is obtained, quote – by abrasion of the annatto seed exocarp in alkaline solution – unquote.
- 6) Norbixin can also be produced from bixin by placing it in an alkaline solution.
- 7) This study set out to test the viability of using Supercritical Carbon Dioxide (SC CO₂) as a medium for bixin and norbixin extraction.
- 8) Recent, quote – restrictions placed on the use of synthetic dyes by the World Health Organization – unquote, has led to renewed interest in developing more efficient extraction methods for bixin and norbixin which, quote – are amongst those [natural dyes] most used in the food, pharmacological and cosmetic industries – unquote.
- 9) The use of SC CO₂ offers the advantages of, quote – being an inert gas, non-toxic, non-inflammable and cheap – unquote. Being a gas, quote – under normal conditions, it is easy to separate from the solute – unquote, which is another huge benefit regarding industrial applications.
- 10) The low critical temperature offered by CO₂ also allows for processing at temperatures moderate enough to avoid thermal degradation of volatile constituents.
- 11) This study sought to investigate the viability of SC CO₂ extraction in three scenarios: extraction of the pigments from whole seeds, extraction of bixin from a pure sample of bixin, and extraction of pigment constituents from the surface of glass beads.
- 12) Early solubility testing showed that norbixin is not soluble in SC CO₂.
- 13) Interestingly, quote – the solubility values for the bixin seed were substantially higher than those for the pure bixin, up to more than ten times higher – unquote. This indicated that the oils present in the seeds were acting as an efficient cosolvent alongside the SC CO₂.
- 14) Trials involving the extraction of pigment constituents placed on the surface of glass beads showed little difference in solubility when compared to that of whole seeds which indicates that the insoluble solid portions of the seed do not play a significant role in extraction.\
- 15) Another portion of this study investigated the solubility of bixin in SC CO₂ as it relates to pressure and temperature. As pressure was increased solubility increased while temperature had a more specific influence. Quote – above 28 MPa, an increase in temperature at constant pressure contributed favorably to an increase in solubility, the opposite occurring below 28 MPa – unquote.
- 16) The authors conclude that the primary pigment, bixin, in annatto seeds can viably be extracted using supercritical carbon dioxide in an industrial process.
- 17) Specifically, quote – the high solubility values show that the supercritical fluid technology can be used industrially to extract these pigments, offering the advantage of being clean, free of organic solvent and accordingly apt for use in the pharmaceutical, cosmetic and food industries – unquote.

Publication: "Extraction of Bixin from Annatto Seeds Using Supercritical Carbon Dioxide." G. F. Silva, Felix M. C. Gamarra, A. L. Oliveira and F. A. Cabral. PDF. 2008.

Review by: SP

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