Natural blue food color from cyanobacteria Spirulina platensis

Malwade, Chandrakant Ramkrishna; Roda Serrat, Maria Cinta; Christensen, Knud Villy; Fretté, Xavier; Christensen, Lars Porskjær

Publication date:
2015

Document version
Final published version

Citation for published version (APA):

Terms of use
This work is brought to you by the University of Southern Denmark through the SDU Research Portal. Unless otherwise specified it has been shared according to the terms for self-archiving. If no other license is stated, these terms apply:

• You may download this work for personal use only.
• You may not further distribute the material or use it for any profit-making activity or commercial gain
• You may freely distribute the URL identifying this open access version

If you believe that this document breaches copyright please contact us providing details and we will investigate your claim. Please direct all enquiries to puresupport@bib.sdu.dk

Download date: 25. Dec. 2019
Natural Blue Food Color from Cyanobacteria *Arthrospira platensis*

**Chandrakant R. Malwade, Maria C. R. Serrat, Knud V. Christensen, Xavier Fretté, Lars P. Christensen**
Department of Chemical Engineering, Biotechnology, and Environmental Technology
University of Southern Denmark, Campusvej 55, Odense M, Denmark
crm@kbm.sdu.dk

### MOTIVATION

Blue colour is an important part of the food color palette used in products such as ice cream, confectionaries, chewing gum and soft drinks. Available blue colors in the market are chemically synthesized, of which EU have the following: Patent blue V, Indigotine, Brilliant blue FCF. Recently concerns have been raised about the safety of synthetic blue colors [1] and together with the growing demand among consumers for natural food colors, this has increased the need for the development of natural blue colors.

### INTRODUCTION

![Phycobilisome structure](image)

**Cultivation of *Arthrospira platensis***

**Extraction**

**Cleavage & Purification**

**Phycocyanobilin**

(Chromophore)

**Phycobilisomes** (Light harvesting complexes of phycobiliproteins)

**Phycocyanin** (Phycobiliprotein)

**Additives removal from Linablu**

- Linablu is washed with methanol to remove additives; methanol selectively dissolves D-trehalose and trisodium citrate.
- Procedure included stirring 50 g Linablu in 400 mL methanol for 30 min.
- Procedure is repeated 5 times; 20 g additive-free Linablu is obtained.
- Methanol washing also aid in denaturation of phycocyanin as depicted below.

**Purification of methanolation mixture**

- Methanolation mixture is purified by using flash column chromatography
- RP C-18 column with acetone and water is used as mobile phase
- 85 mg phycocyanobilin is obtained

**Composition of Linablu**

![Linablu composition](image)

**Additives**

- L-Aspartic acid 20%
- D-Trehalose 25%
- D-Glucose 25%
- D-Mannose 10%
- D-Mannitol 5%
- Malic acid 1%
- Succinic acid 1%
- Trisodium citrate 2%
- Additives 2%

**Cleavage of Phycocyanobilin**

**Methanolation (Methanolysis)**

- 10 g washed Linablu boiled in 400 mL methanol for 16 hrs at 65 °C
- Samples are taken at regular interval from mixture for HPLC analysis
- After 16 hrs, methanol solution is analyzed with HPLC and LC-MS

**REFERENCES**