150 ANOS PARA 118 ELEMENTOS
A TABELA PERIÓDICA

XXVI ENCONTRO NACIONAL

DA SOCIEDADE PORTUGUESA DE QUÍMICA

24, 25 E 26 DE JULHO DE 2019
FACULDADE DE CIÊNCIAS DA UNIVERSIDADE DO PORTO

2019 IYPT
ANO INTERNACIONAL DA TABELA PERIÓDICA

SPQ

U.PORTO
FACULDADE DE CIÊNCIAS UNIVERSIDADE DO PORTO

XXVI ENCONTRO NACIONAL
DA SOCIEDADE PORTUGUESA DE QUÍMICA

150 ANOS PARA 118 ELEMENTOS – A TABELA PERIÓDICA

Livro de Resumos

24, 25 e 26 de julho de 2019

Faculdade de Ciências – Universidade do Porto

Titulo
Livro de resumos do XXVI Encontro Nacional da Sociedade Portuguesa de Química

Editores
Artur Silva
Bruno Fernandes Machado
Joaquim Luís Faria
Raquel Rocha
Victor Freitas

Edição
Sociedade Portuguesa de Química

Design gráfico
Emotive Design | Tiago Marques

Montagem
Comissão Organizadora do XXVI ENSPQ

Data
Julho de 2019

ISBN
978-989-8124-27-2 (edição digital)

Catalogação recomendada
Livro de resumos do XXVI Encontro Nacional da Sociedade Portuguesa de Química
Faculdade de Ciências, Universidade do Porto, 2019 – 450 p.
ISBN 978-989-8124-28-9
Quimica – Congressos

COMISSÃO CIENTÍFICA

Artur Silva, UA - Presidente da SPQ - Chair

Victor Freitas, UP - Chair

Amélia Pilar Rauter, UL

Ana Isabel Ricardo, UNL

António Fernando Silva, UP

Armando Silvestre, UA

Baltazar Manuel Romão de Castro, UP

Carlos Afonso, UL

Fernanda Proença, UM

Isabel Ferreira, IPB

José Alcides Silvestre Peres, UTAD

João Mano, UA

João Paulo Crespo, UNL

João Rocha, UA

João Rodrigues, U. Madeira

Manuela R. Carrott, UEvora

Maria de Lurdes dos Santos Cristiano, UAlg

M. Isabel Ismael, UBI

Mário Nuno Berberan e Santos, UL

Sérgio Seixas de Melo, UC

COMISSÃO ORGANIZADORA NACIONAL

Artur Silva, UA - Presidente da SPQ - Chair

Joaquim L. Faria, UP - Vice-Presidente da SPQ - Chair

Adelino L. M. Galvão, UL -Secretário Geral da SPQ - Chair

Victor Freitas, UP - Chair

Augusto C. Tomé, UA

Carla Susana Lopes Morais, UP

Christopher Michael Ashton Brett, UC

Conceição Rangel, ICBAS

Daniel José Viegas Antunes dos Santos, UL

Eduardo Jorge Figueira Marques, UP

Eurico Cabrita, UNL

João Paulo Rodrigues Fernandes André, UMinho

Jorge Manuel Campos Marques, UC

José Luís Figueiredo, UP

Luís António Ferreira Martins Dias Carlos, UA

Manuel António Coimbra, UA

Manuel Rui Fernandes Azevedo Alves, IPVC

Marco Diogo Richter Gomes da Silva, UNL

Maria Clara Ferreira Magalhães, UA

Maria Matilde Soares Duarte Marques, UL

Mariette M. Pereira, UC

Mário Simões, UA

Pedro Miguel Pimenta Góis, UL

Sofia Rocha Pauleta, UNL

COMISSÃO ORGANIZADORA LOCAL

Victor Freitas UP - chair
Adrian Silva
Alberto Araújo
Ana Luisa Fernandes
Ana Reis
Bruno Machado
Carlos Gomes
Carlos Pereira
Celso Reis
Eduardo Jorge Figueira Marques
Eulália Pereira
Iva Fernandes
Joana Oliveira
João Araújo
José Enrique Borges
Luís Cruz
Luísa do Vale
Manuel Azenha
Marcela Segundo
Maria de Fátima Paiva Martins
Natércia Teixeira
Nuno Mateus
Paula Gameiro
Paula Gomes
Pedro Alexandrino
Raquel Rocha
Rosa Perez Gregório
Susana Soares

Secretariado SPQ
Cristina Campos
Leonardo Mendes

Materials

Development of Double Emulsions from *Sambucus nigra* L. Berry Extract as pH Stable Colorant Formulations

Teixeira, L.G.[a,b,c] Fernandes, I.P.[a,b], Rezende, S.C.[a,b], Reis F.S.[a], Barros L.[a], Leimann, F.V.[c], Ferreira, I.C.F.R.[a,*], Barreiro, M.F. [a,b,*]

a) Centro de Investigação de Montanha (CIMO), Instituto Politécnico de Bragança, Portugal b) Laboratory of Separation and Reaction Engineering - Laboratory of Catalysis and Materials (LSRE-LCM), Polytechnic Institute of Bragança, Campus de Santa Apolonia - 5300-253 Bragança, Portugal; c) Programa de Pós-Graduação em Tecnologia de Alimentos (PPGTA), Universidade Tecnológica Federal do Paraná-Campus Campo Mourão, via Rosalina Maria dos Santos, 1233, CEP 87301-899, Campo Mourão, Paraná, Brazil

Email: iferreira@ipb.pt, barreiro@ipb.pt

Anthocyanins are flavonoids, one of the largest groups of water-soluble vegetable pigments, having also sweetening and antioxidant properties. They are characterized by different colors, such as red, purple, blue and violet. However, their color stability is compromised by variations in pH, temperature, moisture, and luminosity conditions. [1] The berries of *Sambucus nigra* L. have high contents of anthocyanins (cyanidin-3-*O*-sambubioside and cyanidin-3-*O*-sambubioside-5-*O*-glucoside), being a promising option as food coloring agents. [2] Therefore, this work aims to stabilize the natural hydrophilic colorant obtained from *S. nigra* through the preparation of double emulsions (water/oil/water, W/O/W). The *S. nigra* berries were extracted by crushing the fruits to obtain the juice, followed by spray drying to obtain the dry extract. For the preparation of the double emulsions, the procedure was the one described by Paula D. A. *et al*. with some modifications. [3] Briefly, for the first emulsion, the water phase comprised 55 mg/L of the extract and 5% Polyglycerol polyricinoleate (PGPR), homogenized under stirring (20000 rpm, 5 min). This phase was dispersed into corn oil at a W/O ratio of 0.4. (**Figure 1 – (A)**). Thereafter, the second emulsion was prepared by dispersing the previous emulsion in a water phase comprising Tween 80 and gum Arabic, tested at different concentrations. The final W/O/W emulsion was prepared at different primary emulsion/water ratios and stirred at 6000 rpm during 2 min using an Ultra-Turrax system. The produced emulsions were analyzed by optical microscopy (OM) using a Nikon eclipse 50i microscope to assess size and morphology. This analysis showed the presence of spherical and individualized droplets with an estimated particle size between 13 and 16 µm. (**Figure 1 – (B)**). The role of these emulsions as pH stable colorants were tested using different buffers (pH 4-7), as shown in (**Figure 1-(C)**), which also presented the comparison with solutions prepared from the original *S. nigra* extract. The obtained results pointed out for an improved stability and color homogeneity among samples in the tested pH range.

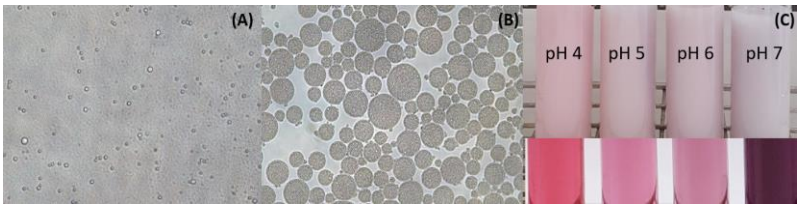

Figure 1: (A) Simple Emulsion, and (B) Double emulsion, and (C) Testing at different pHs (4-7).

Acknowledgements: Associate Laboratory LSRE-LCM (UID/EQU/50020/2019) funded by national funds through FCT/MCTES (PIDDAC) and FCT, and CIMO (UID/AGR/00690/2019) trough FEDER under Program PT2020. To project Valor Natural (Norte-01-0247-FEDER024479) trough FEDER under Program PT2020. To the national funding by FCT, P.I., through the institutional scientific employment program-contract for L. Barros and I.P. Fernandes contract.

References:

1. Smeriglio A.; Barreca D.; Bellocco E.; Trombetta D. *Phytotherapy Research.* **2016**, *30*, 1265-1285.
2. Mlynarczyk K.; Walkowiak-Tomczak D.; Lysiak G P. *Journal of Functional Foods.* **2018**, *40*, 377-390.
3. Paula D A. *et al*. *International Journal of Biological Macromolecules*. **2018**, 117, 665- 672.