

BOOK OF ABSTRACTS

10th Iberian Meeting on Colloids and Interfaces

Edited by
Carla Vitorino
Sandra Nunes
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10th Iberian Meeting on Colloids and Interfaces

Book of Abstracts



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Optimisation of stability and colouring power of double emulsion systems loaded with *Daucus carota* L.

L. Gracher-Teixeira^{1,2,3,4}, *S. C. Silva*^{1,2,3,4}, *G. Colucci*^{1,2,3,4}, *A. Santamaria-Echart*^{1,2}, *A. Peres*^{1,2}, *M. M. Dias*^{3,4}, *M. F. Barreiro*^{1,2,*}

¹ Centro de Investigação de Montanha (CIMO), Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253, Bragança, Portugal.

²Laboratório Associado para a Sustentabilidade e Tecnologia em Regiões de Montanha (SusTEC), Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal.

³LSRE-LCM – Laboratory of Separation and Reaction Engineering - Laboratory of Catalysis and Materials, Faculty of Engineering, University of Porto, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal.

⁴ALiCE – Associate Laboratory in Chemical Engineering, Faculty of Engineering, University of Porto, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal.

*barreiro@ipb.pt

Anthocyanins (ACNs) are water-soluble bioactive flavonoids found in flowers, roots, leaves, seeds, and stalks. ACNs cover a wide palette of colours, from blue and purple through orange to red^{1,2}. They are used in the food industry (food colourant with E163 code), namely in fruit juice concentrates, nectars, jellies, yoghurts, marmalades, potato chips, ice creams, and soft drinks, replacing the synthetic Red 40 colourants. They also have diversified pharmaceutical and cosmetic uses due to their colouring and antioxidant attributes. However, their instability due to pH, light, and temperature is a major concern. This study used a double water-in-oil-in-water ($W_1/O/W_2$) emulsion technique to prevent rapid colour loss and colour variability with pH of a commercial black carrot extract (Fig. 1). A Central Composite Rotatable Design (CCRD) 2^2 was used to examine the effects of colourant concentration (wt%) and emulsion ratio ($(W_1/O)/W_2$) on stability parameters (droplet size ($D_{4,3}$), creaming index (CI), and colourimetric values (L^* , a^*). The main objective was to find an optimised formulation in terms of colourant potential and emulsion stability. Measurements were taken at 1, 7, 15, and 30 days. The optimal experimental design revealed two optimal solutions: 1) 48/52 (W_1/O)/ W_2 ratio with 6 wt.% colorant, and 2) 41/59 (W_1/O)/ W_2 ratio with 11 wt.% colourant. These formulations showed lower creaming index and droplet sizes with higher colourant potential. After accounting for the effect of time, the optimal condition was 6 wt% colourant concentration and 48/52 v/v (W_1/O)/ W_2 emulsion ratio. A stable colour was maintained after 30 days (L^* : 44.11 ± 0.03 , a^* : 25.79 ± 0.01 , $D_{4,3}$: $9.62 \pm 0.1 \mu\text{m}$, and CI: $14.55 \pm 0.99\%$). These findings are promising and might be applicable to produce novel colourants to be applied in several industries, such as food and cosmetics.

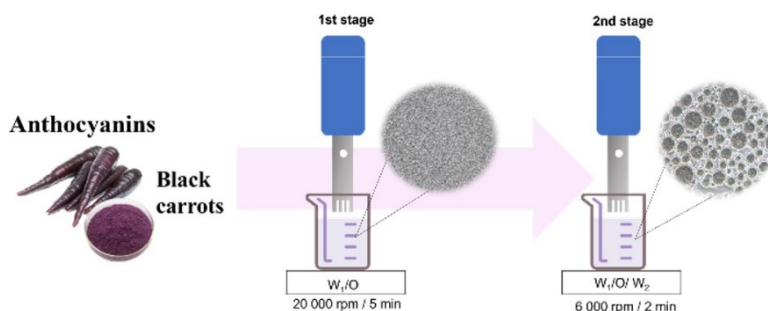


Figure 1: Double water-in-oil-in-water ($W_1/O/W_2$) emulsion technique

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