***Supplementary material***

Microencapsulation of caffeic acid and its release using a w/o/w double emulsion method: assessment of formulation parameters

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Results relative to the product yield and the encapsulation efficiency of all formulations are presented in Table A1

Table A1 – Results of the product yield and encapsulation efficiency of different formulations

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Formulation no.** | **Formulation of the organic phase** | | **Formulation characteristics** | | | |
| **Solvent** | **Polymer concentration**  **(mg/mL)** | **Product yield**  **(M ± SD) a** | **RSD (%)** | **Encapsulation efficiency a**  **(M ± SD) (%)** | **RSD (%)** |
| 1 | DCM | 5 | 75.4 ± 0.5 | 0.7 | 95.6 ± 0.2 | 0.2 |
| 2 | 7.5 | 92.3 ± 3.4 | 3.7 | 97.3 ± 0.1 | 0.1 |
| 3 | 10 | 81.6 ± 2.3 | 2.8 | 97.9 ± 0.2 | 0.2 |
| 4 | DCM/  MeOH  (1:1 v/v) | 15 | 65.9 ± 5.3 | 8.1 | 83.8 ± 0.3 | 0.3 |
| 5 | 22.5 | 78.2 ± 5.0 | 6.4 | 85.7 ± 0.6 | 0.7 |
| 6 | 30 | 69.1 ± 1.8 | 2.6 | 87.1 ± 0.4 | 0.4 |

**a** Data represent mean (M) ± standard deviation (SD); n=3

CAF – Caffeic Acid; DCM – Dichloromethane; MeOH – Methanol; RSD – relative standard deviation; PVA – Polyvinyl Alcohol

Results relative to the in vitro release kinetics (constants and coefficients) of CAF from EC-based microparticles in water (Table A2) and in octanol (Table A3) are here presented.

Table A2 – *In vitro* release kinetics constants and coefficients of CAF from EC-based microparticles in water

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Batch no.** | **Zero order** | | **First order** | | **Higuchi** | | **Korsmeyer-Peppas** | | |
| **R2** | **ko** | **R2** | **k1** | **R2** | **kH** | **R2** | **N** | **K** |
| 1 | -0.753 | 0.059 | -89.190 | 0.024 | 0.140 | 0.300 | 0.798 | -0.271 | 1.125 |
| 2 | 0.151 | 0.039 | -0.466 | -0.017 | 0.653 | 0.183 | 0.883 | 0.231 | 0.362 |
| 3 | 0.574 | 0.031 | -2.061 | -0.369 | 0.818 | 0.145 | 0.963 | 0.559 | 8.246 |
| 4 | -1.864 | 0.054 | -3.582 | -2.809 | -0.487 | 0.277 | 0.839 | 0.116 | 0.690 |
| 5 | 0.273 | 0.001 | 0.150 | -0.216 | 0.701 | 0.165 | 0.934 | 0.289 | 3.622 |
| 6 | 0.713 | 0.001 | 0.698 | -0.169 | 0.819 | 0.123 | 0.891 | 0.679 | 0.084 |

K0 - zero order constant; k1 – first order kinetics constant; kH – Higuchi constant; N – diffusional exponent of Korsmeyer-Peppas equation; K – kinetics constant of Korsmeyer-Peppas equation;

Table A3 – *In vitro* release kinetics constants and coefficients of CAF from EC-based microparticles in octanol

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Batch no.** | **Zero order** | | **First order** | | **Higuchi** | | **Korsmeyer-Peppas** | | |
| **R2** | **ko** | **R2** | **k1** | **R2** | **kH** | **R2** | **N** | **K** |
| 1 | -5.317 | 0.191 | -37.090 | 0.013 | -2.717 | 1.049 | 0.876 | 0.085 | 3.014 |
| 2 | -5.664 | 0.203 | -39.090 | 0.012 | -2.964 | 1.116 | 0.879 | 0.078 | 3.241 |
| 3 | -6.351 | 0.229 | -42.440 | 0.011 | -3.448 | 1.267 | 0.886 | 0.067 | 3.755 |
| 4 | -5.317 | 0.191 | -28.120 | 0.015 | -1.752 | 0.830 | 0.852 | 0.117 | 2.260 |
| 5 | -3.915 | 0.153 | -22.750 | 0.017 | -1.246 | 0.732 | 0.832 | 0.141 | 1.913 |
| 6 | -0.315 | 0.136 | -16.340 | 0.018 | -0.715 | 0.634 | 0.794 | 0.182 | 1.551 |

K0 - zero order constant; k1 – first order kinetics constant; kH – Higuchi constant; N – diffusional exponent of Korsmeyer-Peppas equation; K – kinetics constant of Korsmeyer-Peppas equation;