1. ABOUT THE DATASET

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Title: Data used in the article ‘Development of saturated fat replacers: conventional and nano-emulsions stabilised by lecithin and hydroxylpropyl methylcellulose’

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Organisation: University of Reading

Rights-holder(s): Jansuda Kampa, University of Reading

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Description: This dataset contains data obtained from experimental work of the effect of hydroxylpropyl methylcellulose (HPMC) type (with low and high content of methyl and hydroxypropyl groups: HPMC-L and HPMC-H) and concentration (4, 6, 8 and 10% w/w of HPMC-L and 2, 3, 4 and 5% w/w of HPMC-H) on the formation, stability, and microstructure of conventional emulsions and nanoemulsions made with extra virgin olive oil, and stabilised with lecithin and HPMC. The data was obtained using a high-speed homogenizer and a high-pressure homogenizer to form the emulsions; a dynamic light scattering (DLS) instrument (mean droplet diameter, polydispersity index and ζ-potential), a spectrophotometer (TBARS), a Chroma Meter (colour), a rheometer (viscoelasticity and thermogelation), a pendant drop analyser (surface tension), and a texture analyser (firmness and spreadability).

Cite as:

[Kampa, Jansuda](https://researchdata.reading.ac.uk/view/creators/Kampa=3AJansuda=3A=3A.html) and [Rodriguez-Garcia, Julia](https://researchdata.reading.ac.uk/view/creators/Rodriguez-Garcia=3AJulia=3A=3A.html) (2022): Data used in the article ‘Development of saturated fat replacers: conventional and nano-emulsions stabilised by lecithin and hydroxylpropyl methylcellulose’. University of Reading. Dataset. <https://doi.org/10.17864/1947.000410>

Related publication:

Jansuda Kampa, Richard Frazier and Julia Rodriguez-Garcia. Development of saturated fat replacers: conventional and nano-emulsions stabilised by lecithin and hydroxypropyl methylcellulose. 2022. Foods. Under review.

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2. TERMS OF USE

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3. PROJECT AND FUNDING INFORMATION

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No funding was received.

This work was done as part of Jansuda Kampa’s PhD project ‘Development of a novel nanoemulsion with enhanced nutritional profile to reduce saturated fatty acids in bakery products’ (PhD awarded on the 31st of May 2022).

4. CONTENTS

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Data processing and preparation activities

Data was collected in Excel files. Different tabs have been assigned for different measurements. For data presentation an index tab at the beginning of each Excel file was created with the sample nomenclature, an explanation of the content of the file and a description of each of the variables studied. Data replicates are presented in the same columns with the heading ‘Rep’ or ‘Rep X’ (e.g. Rep1, Rep2, Rep 3).

File listing:

1. RheologyOfHPMC.xlsx: this file contains the data of the rheological properties of HPMC solutions in terms of:
   1. Figure 1A: G' and G" moduli as a function of frequency of HPMC-L solutions and butter
   2. Figure 1B: G' and G" moduli as a function of frequency of and HPMC-H solutions and butter
   3. Figure 2 A and B: G' and G" moduli of HPMC-L solutions as a function of temperature
   4. Figure 2 C and D: G' and G" moduli of HPMC-H solutions as a function of temperature.
2. RheologyOfEmulsions.xlsx: this file contains all the data of the rheological properties of conventional emulsions and nanoemulsions in terms of:
   1. Figure 4: G' and G" moduli as a function of frequency of conventional emulsions, nanoemulsions and butter
   2. Figure 5: G' and G" moduli of conventional emulsions and nanoemulsions as a function of temperature.
3. Texture\_HPMC\_emulsions.xlsx: this file contains the data of the textural properties of HPMC solutions, conventional emulsions and nanoemulsions in terms of:
   1. Table 2: Firmness and work of shear of different concentration of HPMC solutions and butter
   2. Table 3: Firmness and work of shear of butter, conventional emulsions and nanoemulsion stabilised with HPMC (0%, 2% and 4%)
4. PhysicochemStabilityOfEmulsions.xlsx: this file contains data of the physical and chemical stability of emulsions and nanoemulsions in terms of:
   1. Figure 7: Creaming index of emulsions during storage (day 1, 7 and 14) at 4 °C and 20 °C
   2. Figure 8A: Thiobarbituric acid reactive substances (TBARS) mean values according to the type of in emulsions at 4 °C and 20 °C.
   3. Figure 8B: Thiobarbituric acid reactive substances (TBARS) mean values according to the type of in emulsions at 4 °C and 20 °C during storage (day 1, day 7 and day 14).
5. SupplementaryMaterials.xlsx: this file contains data of the analysis done in HPMC solutions, conventional and nanoemulsions in terms of:
   1. Figure S1: Characterisation interfacial tension of HPMC-L and HPMC-H
   2. Table S1: Mean droplet diameter (MDD) and Polydispersity index (PDI) of conventional (CE) and nanoemulsin (NE) stabilised with lecithin and HPMC (0%, 2% and 4%)

Variables explanation

1. RheologyOfHPMC:
   1. HPLC-L: hydroxypropyl methylcellulose with low methoxy and hydroxypropyl content
   2. HPLC-H: hydroxypropyl methylcellulose with high methoxy and hydroxypropyl content
   3. Storage modulus: G'
   4. Loss modulus: G"
2. RheologyOfEmulsions:
   1. Conventional emulsions: CE
   2. Nanoemulsion: NE
   3. Storage modulus: G'
   4. Loss modulus: G"
   5. Percentage (%) of HMPC-L in the emulsion: 0, 2, 4.
3. Texture\_HPMC\_emulsions
   1. HPLC-L: hydroxypropyl methylcellulose with low methoxy and hydroxypropyl content
   2. HPLC-H: hydroxypropyl methylcellulose with high methoxy and hydroxypropyl content
   3. Conventional emulsions: CE
   4. Nanoemulsion: NE
   5. Percentage (%) of HMPC-L in the emulsion: 0, 2, 4.
4. PhysicochemStabilityOfEmulsions
   1. Creaming index (CI)
   2. Thiobarbituric acid reactive substances (TBARS)
   3. Conventional emulsions: CE
   4. Nanoemulsion: NE
   5. Percentage (%) of HMPC-L in the emulsion: 0, 2, 4.
5. SupplementaryMaterials:
   1. Mean droplet diameter (MDD)
   2. Polydispersity index (PDI)

5. METHODS

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Please see Materials and Methods section in the related article:

Jansuda Kampa, Richard Frazier and Julia Rodriguez-Garcia. Development of saturated fat replacers: conventional and nano-emulsions stabilised by lecithin and hydroxypropyl methylcellulose. 2022. Foods. Under review.

The section includes materials, reagents and standards, preparation of HPMC solutions, preparation of conventional emulsions and nanoemulsions, interfacial tension measurement, rheological measurements, textural analysis, droplet diameter, polydispersity index, physicochemical stability and scanning electron microscopy, and statistical analysis.