

ESI

Surface area and volume based mean particle diameters $d_{3,2}$ and $d_{4,3}$, respectively, of the cocoa particles used in this research. Too little of CP3(1;e) was available to conduct particle sizing and cocoa mass (CM(54)) does not lend itself to the particle sizing employed.

Sample code	$d_{3,2}$ (μm)	$d_{4,3}$ (μm)
CP1(1)	5.1 ± 0.3	18.2 ± 2.3
CP2(1)	4.1 ± 0.1	9.6 ± 1.2
CP3(1;e)	-	-
CP4(11)	4.6 ± 0.1	11.4 ± 0.6
CP5(10-12)	4.2 ± 0.0	10.7 ± 0.4
CP6(10-12)	4.3 ± 0.1	11.1 ± 0.9
CP7(10-12)	4.5 ± 0.1	10.3 ± 0.4
CP8(10-12)	4.9 ± 0.2	10.5 ± 0.3
CP9(10-12;n)	3.1 ± 0.3	10.3 ± 0.2
CP10(20-22)	4.48 ± 0.1	14.3 ± 0.8
CM(54)	-	-
CF(5)	8.3 ± 0.3	32.5 ± 1.6

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Mean droplet diameter of emulsions formed with CP5(10-12) at different concentrations measured 1 and 13 days after processing and storage at 20°C (average values \pm 1 standard deviation).

Cocoa particle concentration (% w/w)	$d_{3,2}$ (μm)		$d_{4,3}$ (μm)	
	Day 1	Day 13	Day 1	Day 13
6	5.4 ± 0.1	5.1 ± 0.2	20.6 ± 0.4	19.4 ± 1.4
8	5.2 ± 0.3	5.0 ± 0.2	19.1 ± 1.8	18.5 ± 0.9
10	5.2 ± 0.1	4.8 ± 0.1	18.6 ± 0.4	17.4 ± 0.3

Surface area based mean droplet diameters of emulsions formed with varying sources of cocoa particles followed over 100 days of storage at 20°C.

Cocoa powder	$d_{3,2}$ (μm)			
	Day 1	Day 6	Day 31	Day 100
CP1(1)	5.8 ± 0.1	5.5 ± 0.1	5.4 ± 0.2	5.5 ± 0.4
CP2(1)	5.7 ± 0.1	5.2 ± 0.3	4.8 ± 0.2	4.9 ± 0.1
CP3(1;e)	9.5 ± 0.6	9.0 ± 0.3	10.9 ± 0.3	10.2 ± 0.2
CP4(11)	5.7 ± 0.2	5.4 ± 0.4	5.6 ± 0.4	5.5 ± 0.4
CP5(10-12)	4.7 ± 0.1	4.5 ± 0.2	4.4 ± 0.1	4.4 ± 0.7
CP6(10-12)	6.0 ± 0.3	6.0 ± 0.4	5.0 ± 0.2	5.6 ± 0.5
CP7(10-12)	5.6 ± 0.2	5.5 ± 0.2	5.5 ± 0.2	5.2 ± 0.1
CP8(10-12)	5.3 ± 0.1	5.2 ± 0.1	5.0 ± 0.1	5.0 ± 0.7
CP9(10-12;n)	5.1 ± 0.1	4.9 ± 0.3	4.6 ± 0.2	4.5 ± 0.2
CP10(20-22)	5.9 ± 0.2	5.5 ± 0.0	4.8 ± 0.1	5.6 ± 0.3
CM(54)	10.7 ± 0.4	10.8 ± 0.4	8.3 ± 0.8	9.9 ± 0.7
CF(5)	8.7 ± 0.3	8.5 ± 0.3	8.2 ± 0.1	8.1 ± 0.3

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Volume based mean droplet diameters of emulsions formed with varying sources of cocoa particles followed over 100 days of storage at 20°C.

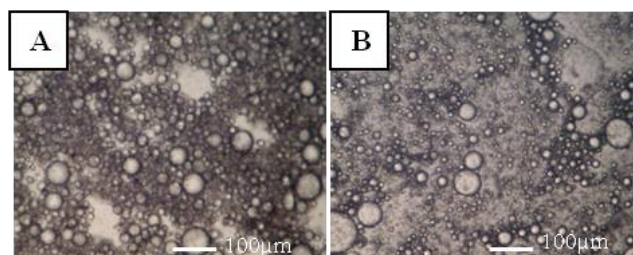
Cocoa powder	$d_{4,3}$ (μm)			
	Day 1	Day 6	Day 31	Day 100
CP1(1)	21.4 ± 0.8	20.1 ± 0.7	19.3 ± 1.5	22.4 ± 3.9
CP2(1)	21.4 ± 0.8	18.9 ± 2.2	15.6 ± 0.9	15.9 ± 0.7
CP3(1;e)	55.2 ± 2.9	54.2 ± 2.1	79.9 ± 5.2	83.7 ± 2.2
CP4(11)	23.0 ± 1.9	22.9 ± 2.3	23.7 ± 1.4	26.9 ± 3.3
CP5(10-12)	15.3 ± 0.5	14.6 ± 0.9	14.3 ± 0.5	19.6 ± 3.0
CP6(10-12)	23.5 ± 2.6	26.9 ± 3.6	18.3 ± 1.8	26.7 ± 5.8
CP7(10-12)	20.8 ± 1.8	21.5 ± 1.2	21.2 ± 2.1	20.5 ± 0.5
CP8(10-12)	18.9 ± 0.9	19.2 ± 0.4	18.2 ± 0.7	23.4 ± 7.6
CP9(10-12;n)	17.9 ± 0.4	17.5 ± 3.7	15.4 ± 1.8	18.0 ± 1.1
CP10(20-22)	24.5 ± 1.5	26.5 ± 2.2	21.6 ± 0.7	33.1 ± 6.0
CM(54)	56.0 ± 2.7	61.7 ± 0.9	56.1 ± 3.5	85.4 ± 7.4
CF(5)	38.9 ± 1.4	38.7 ± 4.5	35.8 ± 0.2	35.5 ± 1.4

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Characteristic particle diameters acquired 1 and 15 days after emulsification at different pH values.

pH	$d_{3,2}$ (μm)		$d_{4,3}$ (μm)	
	Day 1	Day 15	Day 1	Day 15
0	7.1 ± 0.1	6.8 ± 0.2	44.2 ± 1.5	39.0 ± 1.0
1.5	7.2 ± 0.1	6.7 ± 0.1	34.8 ± 0.8	31.6 ± 1.4
6	5.7 ± 0.3	5.2 ± 0.2	22.4 ± 2.0	21.8 ± 2.1
10.5	5.6 ± 0.3	5.3 ± 0.2	21.3 ± 2.0	21.3 ± 1.5
12	5.3 ± 0.3	5.0 ± 0.2	20.2 ± 0.8	19.0 ± 1.0

Light micrographs of emulsions stabilised with CP 10 (20-22) acquired after 1 day of storage at 20°C: A) Washed cocoa particle, B) control emulsion.



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