

Appendices

APPENDIX A

Appendix A.1 Analysis of variance (ANOVA) for extraction yield

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	215.44	5	43.09	5.86	0.0192	significant
A-US amplitude	51.86	1	51.86	7.05	0.0327	
B-US duration	68.61	1	68.61	9.33	0.0185	
AB	22.90	1	22.90	3.11	0.1210	
A ²	49.41	1	49.41	6.72	0.0359	
B ²	31.77	1	31.77	4.32	0.0763	
Residual	51.50	7	7.36			
Lack of Fit	51.47	3	17.16	2216.27	<0.0001	significant
Pure Error	0.0310	4	0.0077			
Cor Total	266.94	12				
Std. Dev.		2.71	R²			0.8071
Mean		78.10	Adjusted R²			0.6693
C.V.%		3.47	Predicted R²			-0.3712
			Adeq Precision			6.5102

Appendix A.2 Analysis of variance (ANOVA) for carotenoid recovery

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	207.08	5	41.42	5.86	0.0192	significant
A-US amplitude	49.85	1	49.85	7.05	0.0327	
B-US duration	65.94	1	65.94	9.33	0.0185	
AB	22.02	1	22.02	3.11	0.1210	
A ²	47.49	1	47.49	6.72	0.0359	
B ²	30.54	1	30.54	4.32	0.0763	
Residual	49.50	7	7.07			
Lack of Fit	49.47	3	16.49	2214.80	<0.0001	significant
Pure Error	0.0298	4	0.0074			
Cor Total	256.58	12				
Std. Dev.		2.66	R²			0.8071
Mean		76.57	Adjusted R²			0.6693
C.V.%		3.47	Predicted R²			-0.3712
			Adeq Precision			6.5102

Appendix A.3 Analysis of variance (ANOVA) for antioxidant activity

Source	Sum of squares	df	Mean square	F-value	p-value	
Model	558.29	5	111.66	11.40	0.0029	significant
A-US amplitude	3.75	1	3.75	0.3835	0.5553	
B-US duration	319.39	1	319.39	32.62	0.0007	
AB	2.47	1	2.47	0.2528	0.6306	
A ²	161.15	1	161.15	16.46	0.0048	
B ²	100.80	1	100.80	10.30	0.0149	
Residual	68.53	7	9.79			
Lack of Fit	68.42	3	22.81	823.52	<0.0001	significant
Pure Error	0.1108	4	0.0277			
Cor Total	626.82	12				
Std. Dev.		3.13	R²			0.8071
Mean		44.40	Adjusted R²			0.8126
C.V.%		7.05	Predicted R²			0.2235
			Adeq Precision			8.4074

APPENDIX B
SPECIFICATIONS

Appendix B.1 Specifications for probe type ultrasound system

Parameter	Value
Power	: 750 W
Amplitude	: 40-100%
Frequency	: 20 kHz
Probe diameter	: 25 mm
Capacity	: 500-1000 ml

Appendix B.2 Specifications for SFE system

Parameter	Value
Power requirement	: 415 V, upto 64 A
Condenser	
Maximum operating pressure	: 35 MPa (5100 psi)
Flow meter	
Standard flow rate	: 3 kg/hr (50g/min)
Maximum operating pressure	: 60 MPa (8700 psi, allowance for relief or safety devices)
Maximum design pressure	: 68.9 MPa (10,000 psi)
Control	: Computed flow control, pressure control, flow meter control (with purchase of flow meter option)
Cosolvent pump	
Standard flow rate	: 3 kg/hr (50g/min)
Maximum operating pressure	: 60 MPa (8700 psi, allowance for relief or safety devices)
Maximum design pressure	: 68.9 MPa (10,000 psi)
Control	: Computed flow control, pressure control, flow meter control (with purchase of flow meter option)
Pre heater	
Maximum operating pressure	: 68.9 MPa (10,000 psi)

Extraction vessel

Capacity	:	500 ml
Maximum operating pressure	:	60 MPa (8700 psi), design 68.9 MPa
Maximum operating temperature	:	423.15 K
Temperature control	:	Electric heat jacket and thermocouple
Design criteria and certifications	:	ASME Section VIII, Div. 1; European Pressure Equipment Directive (PED-2014/68/EU). Note: Actual certificate issued by Notified Body for ASME or PEF is at additional cost and listed in options
Hydrostatic test pressure	:	1.5 X design pressure

Automated back pressure regulator

Standard flow rate	:	12 kg/hr (200 g/min)
Maximum operating pressure	:	60 MPa (8700 psi), design 68.9 MPa
Pressure control	:	Pressure sensor

Vaporiser

Maximum operating pressure	:	51.5 MPa (7500 psi)
----------------------------	---	---------------------

Seperator

Volume	:	1 Litre
--------	---	---------

Maximum : 18 MPa (2610 psi); Design 20 MPa
operating pressure

Maximum : 343.15 K
operating
temperature

Control : Pressure control using Manual Back Pressure
Regulator, Pressure gauge, Pressure Sensor.

Temperature control with electric heat jacket and
thermocouple
