





(EUROPE)

Kerone Research & Development Centre (KRDC)

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Batch Microwave + Convection Heat Treatment for Drying of Whole Chilli

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Customer :	M/s. Fresh Ground
Process :	Batch Microwave + Convection Heat Treatment for Drying of Whole Chilli

Test Report No: 136/KRDC/LAB/17 Mum 07/09/2022

Date Sample reception	: 07/09/2022
ID	: 136/LAB/07
Sample Description:	

Sampling	: As Requested
Sample Condition	: Acceptable
Quantity	: 1 kg approx.
Sampling date	: 07/09/2022
Product	: Whole Chilli
Start Date test	: 07/09/2022
End Date test	: 07/09/2022
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Laboratory Experimental System -



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System Specifications -

Microwave Power	2 KW (CW)
Frequency	$2450 \text{ MHz} \pm 50$
Convective Power	3.5 KW (airflow 350 I/min at 20°C)
Microwave Exposure Zone (Cavity)	1 Cubic meter
Mode Stirrer	One
Thermal Monitoring System	Single Channel Fiber Optic: Range - 40 to 250°C
Exhaust Power	1 HP
Tray size (width*height*depth)	450*950*50 mm

Laboratory's Environmental Conditions -

Temperature (degree C)	29.4°C (±5°C)
Humidity (%)	≤50% RH
Pressure (kN/m2 or kPa)	Not recorded

Note for recommendation: Environmental conditions have a direct impact on test results. Accuracy and consistency of test data are affected by the laboratory conditions

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Equipment Used -

Name of Equipment	Picture of Equipment	Specifications
Compact Thermal Imaging Camera		Model: FLIR E-30 Resolution: 160x 120IR Thermal sensitivity of 0.10°C
Thermo Hygrometer	and a state	Model No: HTC-2 Temperature accuracy: ±°C (1.8°F) Temperature resolution: 0.1°C (0.2°F) Humidity range: 10%~99% RH Humidity accuracy: ±5% RH Humidity resolution: 1% RH
Moisture Analyzer		Make: Axis Balance Description: Moisture range: 1%(sample 0.02/0.05g), 0.1% (Sample 0.5/5g), 0.01%(Sample>5g)

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<u>Procedure of the Experiment</u> -

- The experiment was performed on the Whole Chilli to speed up the heating rate.
- For this experimental run, the given sample was taken in glass tray and placed in the MW + Convection heating system with suitable parameters.
- After the heating treatment, the sample was analyzed.

Analytical Results:

Trial 1 –

Initial Weight – 200g Initial Moisture – 12.4%

Cycles	Cycle time	System Specifications	Moisture	On Product	
	(mints.)		Content	temperature	Remark
			(%)		
C1	After 5 mints.	Magnetron Power: 0.5 kW;	15	(60-70)°C	Drying started
		Set temp: 50°C			
C2	After 10 mints.	Magnetron Power: 0.5 kW;	11.2	(70-75)°C	Drying continuous
		Set temp: 50°C			
C3	After 15 mints.	Magnetron Power: 0.5 kW;	7.4	(75-80)°C	Drying Variants
		Set temp: 50°C			
C4	After 20 mints.	Magnetron Power: 0.5 kW;	6.7	(75-80)°C	Dried as desired
		Set temp: 50°C			

Final Weight – 190g Final Moisture – 6.7% Total Cycle time - 20 mints.

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Trial 2 –

Initial Weight – 200g Initial Moisture – 12.4%

Cycles	Cycle time (mints.)	System Specifications	Moisture Content (%)	On Product temperature	Remark
C1	After 15 mints.	Magnetron Power: 0.5 kW;	10.2	(70-75)°C	Drying started
		Set temp: 50°C			
C2	After 5 mints.	Magnetron Power: 0.5 kW;	7.6	(70-77)°C	Dried as desired
		Set temp: 50°C			

Final Weight – 188g Final Moisture – 7.6% Total Cycle time - 20 mints.

Trial 3 –

Initial Weight – 200g Initial Moisture – 12.4%

Cycles	Cycle time (mints.)	System Specifications	Moisture Content (%)	On Product temperature	Remark
C1	After 10 mints.	Magnetron Power: 0.7 kW; Set temp: 75°C	8	(70-75)°C	Drying started
C2	After 10 mints.	Magnetron Power: 0.7 kW;	5.1	(75-83)°C	Dried as desired
	riter to mints.	Set temp: 75℃	5.1	(15 85) C	Dired us desired

Final Weight – 189g Final Moisture – 5.1% Total Cycle time - 20 mints.

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Trial 4 –

Initial Weight – 200g Initial Moisture – 12.4%

Cycles	Cycle time (mints.)	System Specifications	Moisture Content (%)	On Product temperature	Remark
C1	After 20 mints.	Magnetron Power: 0.7 kW;	4.1	(70-82)°C	Dried as desired
		Set temp: 75 °C;			
		Heater temp: 80 °C			

Final Weight – 186g Final Moisture – 4.1% Total Cycle time - 20 mints.

Before and After Treatment Images:



Initial Sample

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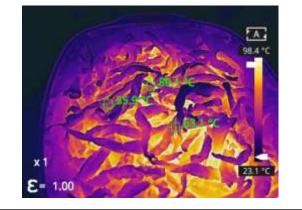


Final Sample (Trial 1, Trial 2)



Final Sample (Trial 3, Trial 4)

Sp1	80.1°C
Sp2	55.9 °C
Sp3	63.1°C
Parameters	
Emissivity	1.00



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The value obtained is already corrected for possible recover value stated, if applicable. This document may not be reproduced or disclosed wholly or partly in any part thereof without the written consent of the laboratory management or customer. This document relates only to the specimen samples processed. The processed sample will be kept in this laboratory for 7 days from the date of heat treatment.

Thermal Images:

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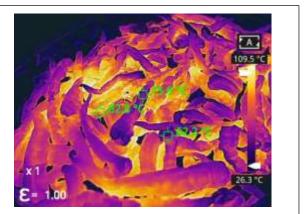
Sp1	59.1 °C
Sp2	64.6 °C
Sp3	77.0 °C
Parameters	
Emissivity	1.00
Temp.	105.1 °C



Sp1	82.8°C
Sp2	73.0 °C
Sp3	83.1 °C
Parameters	
Emissivity	1.00
Temp.	102.7 °C



Sp1	75.9 °C
Sp2	82.8 °C
Sp3	62.2 °C
Parameters	
I al allietel S	
Emissivity	1.00



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Moisture Report:

Drying start	ed		Drying start	ed		Drying start	rd
Date : 7-09-2022 Time :12:50:42 Model:A58200 Serial number : Drving parameters	138		Date : 7-99-2022 Time :13:15:09 Model:465200 Serial mamber : Drying parameters	130		Dute 1 7-09-2022 Time 117:51140 Model:668200 Seriel number 1 Drying persenters	
Product	: 0	-	Freduct	: 0		Product	1 2
Brying temperature	: 105,	0 °C	Drying temperature	: 105.0	*C	Drying temperature	105.0 *5
Mode Calculation	: standard : Short ucd : ((c0-a)/# : 3 sample	0)*1007	Drying profile Node Calculation Finished	: standard : Short eode : ((s0-n)/eO) : 3 samples	1#100X	Calculation	s Thight hode
Initial weight	r 0.54	1 9	Initial weight	: 0.582	9	Initial weight	: 0.705 g
Final weight	: 0.47	4 g	Final weight	: 0.543	9	Final weight	: 0.834 g
Drying tire Scopling interval	: 00:04:0	0¢ O sec	Drying time Sampling interval	1 00:63:001 2 20	sec	Drying ties Sampling interval	: 00:05:00: ; 20 sec
	t 12.		Moisture	: 6.7		Moisture	: 7.5 T
NOTE Initial .	noishi	rt	HOTE Trial 1	finalmo	istuar	NOTE Trial 2	final moistur
The analysis perfo	rned bys		The analysis perfo	reed by:		The analysis perfor	and by:
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Date : 7-09-2022		
Date : 7-09-2022 Time :12:50:42		
Mode1:A08200		
Serial number #		138
Drying parameters		
Product	;	0
Brying tesperature	;	105.0 *0
Drying profile		standard
Hode	1	Short mode
Calculation	÷	((n0-u)/m0)#1000
Finished	8	3 samples
Initial weight	t	0.541 g
Final weight	t	0.474 g
Drying time	t	00:04:00s
Sampling interval	;	20 sec
Hoisture	÷	12.4 %
NOTE Initial	h	oishure
The analysis perfo	r F	ed by:
N.	-	. برنا

139 r 0
r 0
τ Ο
; 105.0 °C
: standard
: Short mode
: ((n0->)/x0)#100%
: 3 samples
: 0.690 g
: 0.655 g
1 00:02:40s
: 20 sec
1 5.1 X
100 100 100 100 100 100 100 100 100 100

	138	
;	ð	
:	105.0	*0
Ţ	standard	
÷	((a0-n)/a8)	\$100%
1	3 samples	
\$	0.945	3
1	0.905	9
÷	00:03:40:	
1	20	SBC
ж	4,1	Z.
f	nel no	ishin
		: standard : Short eode : ((s0-m)/s0) : 3 samples : 0.945 : 0.905 : 00:03:40s : 20

Signature...

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Observations:

The heating behavior of Chilli was investigated under the Microwave heating system. The heating rate was found to be increasing with respect to increasing in time. As per the physical investigation, it was observed that the crispiness of the product after the treatment was achieved in the sample with moisture content below 5%, and desired moisture was achieved without any charring effect.

Ms. Sayali Asole (Tested By)

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