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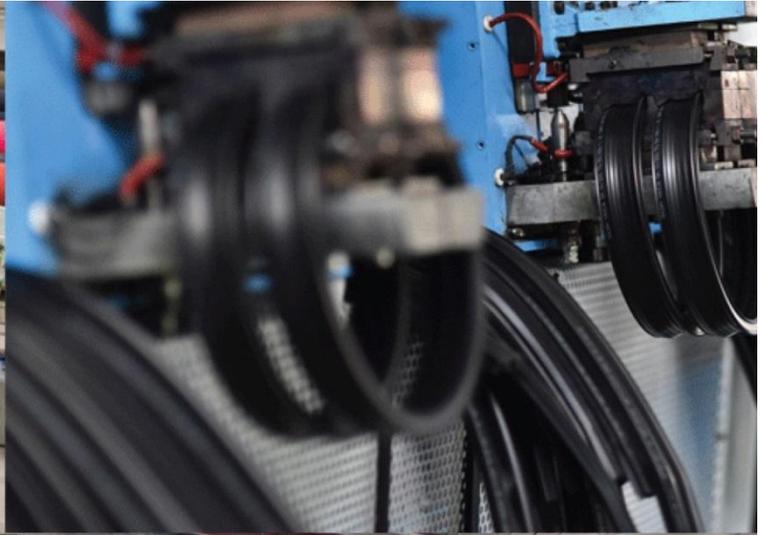
A.M.P.E.R.E (EUROPE)

In Association With



ELECTRO MAGNETIC innovative technologies

Kerone Research & Development Centre (KRDC),
B/47, Addl. MIDC. Anand Nagar, Ambarnath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com



Batch Convection Heat Treatment for Drying of
Coloured Chillies & Microwave+Convection
Treatment for Sterilization of Dry Chillies



ISO 9001-2008 | ISO 9001-2015 | EMS 14001 | OHSAS 18001
In Association with SVCH-Technologii, Moscow (Russia)



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Customer :	M/s. Essence of Africa
Process :	Batch Convection Heat Treatment for Drying of Coloured Chillies & Microwave+Convection Treatment for Sterilization of Dry Chillies

TEST REPORT No: 47/KRDC/LAB/17 Mum 28/12/2018

Date Sample reception : 28/12/2018

ID : 47/LAB/72

SAMPLE DESCRIPTION:

Sampling : As Requested

Sample Condition : Acceptable

Quantity : ½ kg

Sampling date : 28/12/2018

Product : Coloured chillies

Requirement : Final product must have moisture content less than 8% and its Sterilization

Start Date test : 28/12/2018

End Date test : 29/12/2018

LABORATORY EXPERIMENTAL SET UP:

1. Batch Convection Heating System:



Formac. 1/KRDC/01



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2. Batch Microwave+Convection Heating System:



LAB BATCH CONVECTION HEATING SYSTEM SPECIFICATIONS:

Heating Zone (width*height*depth)	510*480*410 mm
No. of Heaters	6
Total Heater Power	6 kW
Motor	0.5 HP
Centrifugal Exhaust Blower	1440 rpm
No. of trays	6
Tray size (width*height*depth)	560*25*435 mm

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LAB BATCH MICROWAVE+CONVECTION HEATING SYSTEM SPECIFICATIONS:

Microwave Power	2 kW(CW)
Frequency	2450 MHz \pm 50
Convective Power	3.5 kW (air flow 350 l/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	1HP
Tray Size	450x950x50 mm

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (°C)	28.1°C (\pm 5°C)
Humidity (%)	\leq 64% 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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EQUIPMENTS USED:

Name of Equipment	Picture of Equipment	Specifications
Compact Thermal Imaging Camera		Model: FLIR E-30 Resolution: 160x 120 IR Thermal sensitivity of 0.10°C
Moisture Analyzer		Make: Axis Balance Description: Moisture range: 1%(sample 0.02/0.05g), 0.1% (Sample 0.5/5g), 0.01%(Sample>5g)
Thermo Hygrometer		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

SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on given coloured chillies without adding any additive to speed up the drying rate. For this experimental run, the chillies on dehydrator tray have placed in such a manner that none of them are touching and there is some space around each for air to circulate for achieving even drying characteristics. The observations are made on LOD basis after every one hour. Also, initial weight before drying, final weight after drying, initial moisture content, final moisture content after heat treatment has been noted. And after drying treatment, dried chillies have been seal packed in plastic bag and packed bag has been treated in microwave+convection heating system for sterilization treatment.

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ANALYTICAL RESULTS:

1. DRYING TREATMENT:

Setting Temperature: 70°C

Initial Moisture Content: 88.7%

Initial Weight: 447 grams

Sr. No.	Time (hours)	Weight noted (grams)	Total weight loss (%)	Temperature on sample(°C)	Remarks, if any
1.	After 1	367	17.9	47.8	Drying rate started
2.	After 2	306	31.54	52.1	Drying phase continue
3.	After 3	244	45.41	56.9	Variant of Drying rate
4.	After 4	191	57.27	61.2	Variant of Drying rate
5.	After 5	153	65.77	66.4	Variant of Drying rate
6.	After 6	114	74.5	69.7	Variant of Drying rate
7.	After 7	87	80.54	70.3	Required Drying rate

Sample weight after drying: 87grams

Total weight loss on drying: 80.54%

Final Moisture Content: 4.5%

2. STERILIZATION TREATMENT:

Microwave Power: 1.2 kW

Setting Temperature: 60°C

Cycle Time: 2.5 minutes

Product Temperature: 63°C



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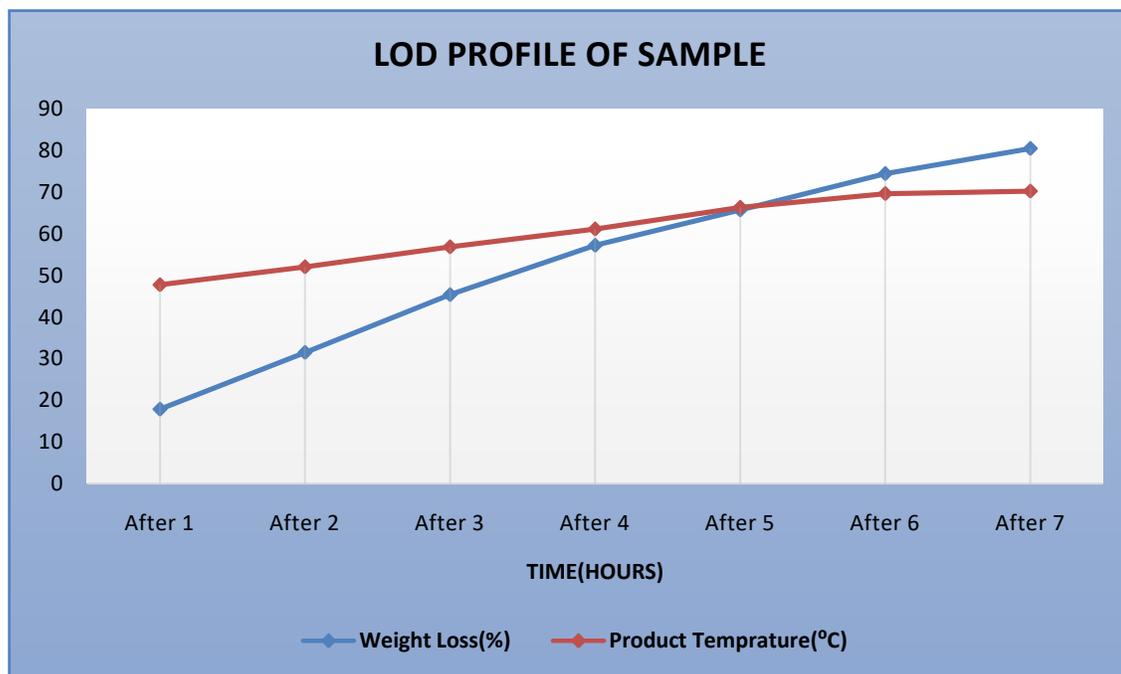


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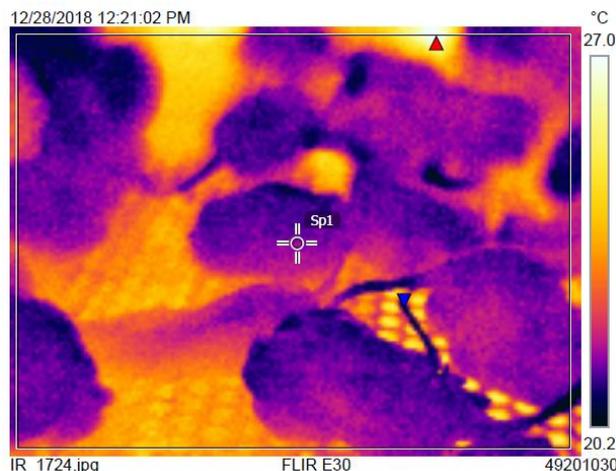
GRAPHICAL REPRESENTATION OF DRYING PARAMETERS:



THERMAL IMAGE BEFORE AND AFTER HEAT TREATMENT:

1. Before Heat Treatment:

Measurements		
Bx1	Max	27.4 °C
	Min	19.8 °C
	Average	21.9 °C
Sp1		21.6 °C
Parameters		
	Emissivity	0.95
	Refl. temp.	20 °C



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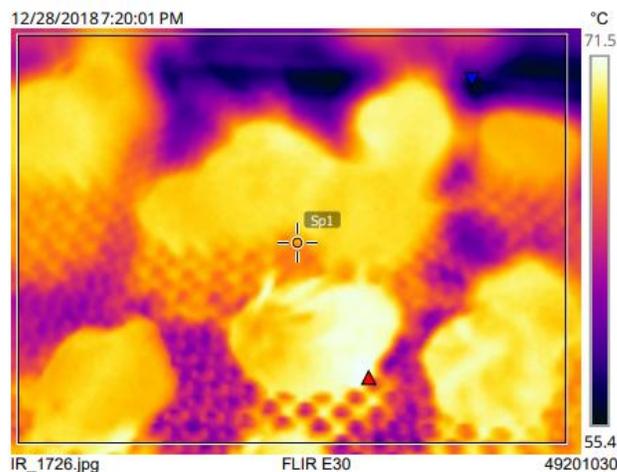
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2. After Heat Treatment:

Measurements		
Bx1	Max	72.1 °C
	Min	54.3 °C
	Average	63.2 °C
Sp1		70.3 °C

Parameters	
Emissivity	0.95
Ref. temp.	20 °C



BEFORE AND AFTER PICTURES OF TREATED SPECIMEN SAMPLE:



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MOISTURE ANALYSIS REPORTS:

Drying started		Drying started	
Date	: 20-12-2018	Date	: 19-12-2018
Time	: 11:10:50	Time	: 15:31:30
Model	: AGS200	Model	: AGS200
Serial number	: 138	Serial number	: 138
Drying parameters		Drying parameters	
Product	: Test	Product	: Test
Drying temperature	: 105.0 °C	Drying temperature	: 105.0 °C
Drying profile	: standard	Drying profile	: standard
Mode	: Short mode	Mode	: Short mode
Calculation	: $((m0-m)/m0)*100\%$	Calculation	: $((m0-m)/m0)*100\%$
Finished	: 3 samples	Finished	: 3 samples
Initial weight	: 2.309 g	Initial weight	: 3.074 g
Final weight	: 2.229 g	Final weight	: 3.064 g
Drying time	: 00:10:00s	Drying time	: 00:01:40s
Sampling interval	: 20 sec	Sampling interval	: 20 sec
Moisture	: 3.5 %	Moisture	: 0.3 %
NOTE	Initial	NOTE	Final
The analysis performed by:		The analysis performed by:	
Signature	<u>KKomal</u>	Signature	<u>KKomal</u>

OBSERVATIONS:

The drying behavior of coloured chillies has been investigated under the batch convection heating system. The heating rate is found to be increasing with respect to increasing heating time. It has been found that the moisture content on the dry basis (%) decreases with respect to increase drying time. As per physical investigation, it has been observed that there is little crunchiness in texture and colour change was observed and in sterilization treatment there was no damage to plastic bag during treatment.

KKomal

Miss Komal Bhoite
Tested By