

A CRISIL-NSIC RATED COMPANY ISO-9001-2008 COMPANY



In Association With



Kerone Research & Development Centre (KRDC), B/47, Addl. MIDC. Anand Nagar, Ambernath (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 :	Laboratory Experimental Analysis
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:



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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 ± 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 (±5°C)
Humidity (%)	≤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	THE REPORT	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 beenmtreated 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.	Time	Weight noted	Total weight	Temperature on	Remarks, if any
No.	(hours)	(grams)	loss (%)	sample(°C)	
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. <u>STERILIZATION TREATMENT:</u> Microwave Power: 1.2 kW Setting Temperature: 60°C Cycle Time: 2.5 minutes Product Temperature: 63°C

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GRAPHICAL REPRESENTATION OF DRYING PARAMETERS:



THERMAL IMAGE BEFORE AND AFTER HEAT TREATMENT:

1. Before Heat Treatment:

Measu	irements	
Bx1	Max	27.4 °C
	Min	19.8 °C
	Average	21.9 °C
Sp1		21.6 °C
Param	eters	
Emissivi	ty	0.95
Roft tom	n	20 °C



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2. After Heat Treatment:

Measu	rements	
Bx1	Max	72.1 °C
	Min	54.3°C
	Average	63.2°C
Sp1		70.3°C
Param	eters	
Emissivit	y	0.95
Refl. tem	ip.	20 °C

BEFORE AND AFTER PICTURES OF TREATED SPCIMEN SAMPLE:





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MOISTURE ANALYSIS REPORTS:

?* Drying started	Drying started
Date :28-12-2018 Time :12:49:33 Model:AGS200 Serial number : 138	Date :29-12-2018 Time :15:04:30 Model:AGS200 Serial number : 138
Drying parameters	Drying parameters
Product : Test	Product : Test
Drying temperature : 105.0 °C	Drying temperature : 105.0 °C
Drying profile : standard Mode : Short mode Calculation : ((mO-m)/mO)*100% Finished : 3 samples	Drying profile : standard Mode : Short mode Calculation : ((mO-m)/mO)#100% Finished : 3 samples
Initial weight : 0.568 9	Initial weight : 0.915 g
Final weight : 0.064 g	Final weight : 0.874 g
Drying time : 00:31:20s Sampling interval : 20 sec	Drying time : 00:02:20s Sampling interval : 20 sec
Moisture : 88.7 %	Moisture : 4.5 %
NOTE Initial	NOTE Final
The analysis performed by:	The analysis performed by:
KKomat	KKomat

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.

Miss Komal Bhoite Tested By

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