



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

Member Of



AIMCAL (USA)



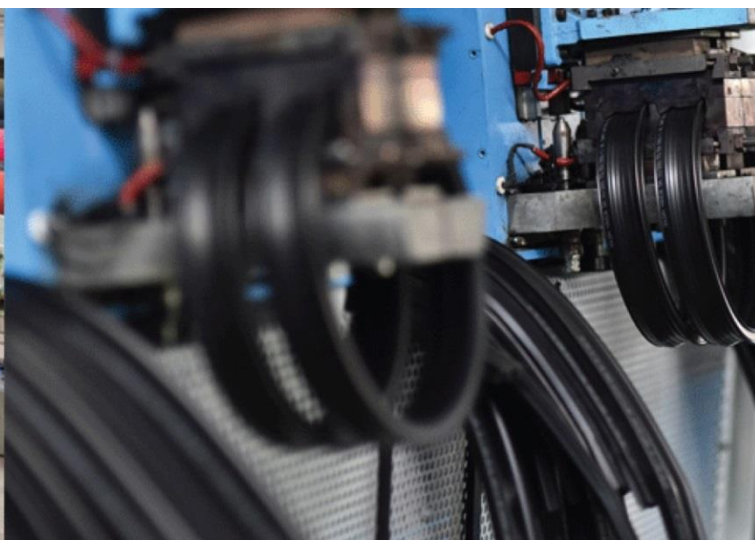
A.M.P.E.R.E (EUROPE)

In Association With



ELECTRO MAGNETIC innovative technologies

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



**Batch Microwave+Convection Heat
Treatment for Dehydration of Cooked food**

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



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

Customer :	Laboratory Experimental Analysis
Process :	Batch Microwave+Convection Heat Treatment for Dehydration of Cooked food

TEST REPORT No: 47/KRDC/LAB/17 Mum 15/12/2018

Date Sample reception : 15/12/2018
ID : 47/LAB/70

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : 4 boxes
Sampling date : 15/12/2018
Product : Cooked food (Gravy, pavbhaji, poha, sabudana khichdi)
Requirement : Final product should be dried like powder form with minimum moisture content
Start Date test : 15/12/2018
End Date test : 15/12/2018

LABORATORY EXPERIMENTAL SET UP:



Format: F/R&D/01



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 (degree C)	28.2°C (\pm 5°C)
Humidity (%)	\leq 65% RH
Pressure (kN/m ² 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



EQUIPMENTS 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
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: $\pm^{\circ}\text{C}$ (1.8°F) Temperature resolution: 0.1°C (0.2°F) Humidity range: 10%~99% RH Humidity accuracy: $\pm 5\%$ RH Humidity resolution: 1% RH

SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on cooked food in batch microwave heating system for dehydration treatment. For this, given cooked food samples has been placed on microwave safe tray with uniform layer to achieve even drying characteristics in microwave system. Drying treatment has been continued till it gives dry powder form of texture. After every half hour pictures of dried samples has been captured and toppling is given to samples.



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

ANALYTICAL RESULTS:

Microwave Power: 0.5 kW

Temperature: 45°C

	Poha	Sabudana Khichdi	Pavbhaji	Gravy
Initial Moisture Content (%)	10.4	37.2	72.4	67.8
Final Moisture Content (%)	2.5	0.4	1.5	1.6
Total Drying Time (hours)	2.5	3	4	3.5

SAMPLE PICTURES DURING TRIAL:

1. After 30 minutes:



Format: F/R&D/01



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

2. After 60 minutes:



3. After 90 minutes:



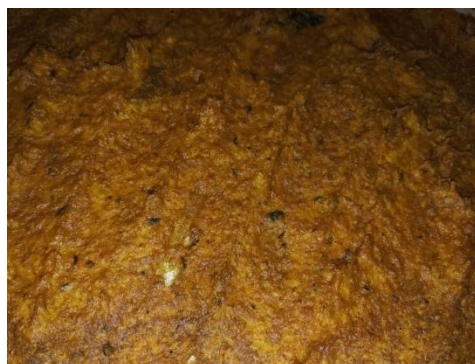


Kerone Research & Development Centre (KRDC)

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



4. After 120 minutes:





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

5. After 150 minutes:



6. After 180 minutes:





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

7. After 210 minutes:



8. After 240 minutes:





ELECTRO MAGNETIC Innovative technologies



KERONE

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

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

MOISTURE ANALYSIS REPORTS:

Drying started		Drying started		Drying started		Drying started	
Date :15-12-2018	Time :15:55:12	Date :15-12-2018	Time :16:44:07	Date :15-12-2018	Time :15:45:51	Date :15-12-2018	Time :16:59:21
Model:AGS200	Serial number : 138	Model:AGS200	Serial number : 138	Model:AGS200	Serial number : 138	Model:AGS200	Serial number : 138
Drying parameters		Drying parameters		Drying parameters		Drying parameters	
Product	: Test	Product	: Test	Product	: Test	Product	: Test
Drying temperature :	105.0 °C	Drying temperature :	105.0 °C	Drying temperature :	105.0 °C	Drying temperature :	105.0 °C
Drying profile	: standard	Drying profile	: standard	Drying profile	: standard	Drying profile	: standard
Mode	: Short mode	Mode	: Short mode	Mode	: Short mode	Mode	: Short mode
Calculation	: ((w0-w)/w0)*100%	Calculation	: ((w0-w)/w0)*100%	Calculation	: ((w0-w)/w0)*100%	Calculation	: ((w0-w)/w0)*100%
Finished	: 3 samples	Finished	: 3 samples	Finished	: 3 samples	Finished	: 3 samples
Initial weight	: 0.647 g	Initial weight	: 0.804 g	Initial weight	: 0.914 g	Initial weight	: 1.208 g
Final weight	: 0.590 g	Final weight	: 0.794 g	Final weight	: 0.574 g	Final weight	: 1.003 g
Drying time	: 00:08:00s	Drying time	: 00:03:20s	Drying time	: 00:33:40s	Drying time	: 00:01:40s
Sampling interval	: 20 sec	Sampling interval	: 20 sec	Sampling interval	: 20 sec	Sampling interval	: 20 sec
Moisture	: 10.4 %	Moisture	: 2.5 %	Moisture	: 37.2 %	Moisture	: 0.4 %
NOTE Poha - Initial		NOTE Poha - final		NOTE Sabudana Khicdi - Initial		NOTE Sabudana Khicdi - final	
The analysis performed by:		The analysis performed by:		The analysis performed by:		The analysis performed by:	
Signature: <u>KKomal</u>		Signature: <u>KKomal</u>		Signature: <u>KKomal</u>		Signature: <u>KKomal</u>	

Drying started		Drying started		Drying started		Drying started	
Date :15-12-2018	Time :16:41:44	Date :17-12-2018	Time :10:22:03	Date :15-12-2018	Time :15:10:20	Date :15-12-2018	Time :17:13:38
Model:AGS200	Serial number : 138	Model:AGS200	Serial number : 138	Model:AGS200	Serial number : 138	Model:AGS200	Serial number : 138
Drying parameters		Drying parameters		Drying parameters		Drying parameters	
Product	: Test	Product	: Test	Product	: Test	Product	: Test
Drying temperature :	105.0 °C	Drying temperature :	105.0 °C	Drying temperature :	105.0 °C	Drying temperature :	105.0 °C
Drying profile	: standard	Drying profile	: standard	Drying profile	: standard	Drying profile	: standard
Mode	: Short mode	Mode	: Short mode	Mode	: Short mode	Mode	: Short mode
Calculation	: ((w0-w)/w0)*100%	Calculation	: ((w0-w)/w0)*100%	Calculation	: ((w0-w)/w0)*100%	Calculation	: ((w0-w)/w0)*100%
Finished	: time over	Finished	: 3 samples	Finished	: 3 samples	Finished	: 3 samples
Initial weight	: 2.503 g	Initial weight	: 0.779 g	Initial weight	: 0.822 g	Initial weight	: 1.215 g
Final weight	: 0.492 g	Final weight	: 0.767 g	Final weight	: 0.265 g	Final weight	: 1.196 g
Drying time	: 01:29:29s	Drying time	: 00:01:40s	Drying time	: 00:27:20s	Drying time	: 00:02:40s
Sampling interval	: 20 sec	Sampling interval	: 20 sec	Sampling interval	: 20 sec	Sampling interval	: 20 sec
Moisture	: 72.4 %	Moisture	: 1.5 %	Moisture	: 67.8 %	Moisture	: 0.6 %
NOTE Pav Bhaji Initial		NOTE Pav bhaji - final		NOTE Gravy - Initial		NOTE Gravy - final	
The analysis performed by:		The analysis performed by:		The analysis performed by:		The analysis performed by:	
Signature: <u>KKomal</u>		Signature: <u>KKomal</u>		Signature: <u>KKomal</u>		Signature: <u>KKomal</u>	

Format: F/R&D/01

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.



OBSRVATIONS:

The Drying behavior of cooked food has been investigated under the microwave+convection heating system. The drying rate is found to be increasing with respect to increasing drying 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 crunchiness in texture without burning and there is little colour change in every sample. Also there is stickiness observed in case of Sabudana Khichdi.

Miss Komal Bhoite
Tested By