



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, Ambarnath (East), Thane - 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com



**Continuous Microwave+IR Heat
Treatment for Drying of Sprouted Mung Bean**

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



EMITECH ASSOCIATES/Authorized Distributor



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

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

Customer :	M/s. Heena Enterprise
Process :	Continuous Microwave+IR Heat Treatment for Drying of Sprouted Mung Beans

TEST REPORT No: 47/KRDC/LAB/17 Mum 06/07/2020

Date Sample reception : 04/07/2020
ID : 47/LAB/165

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : 2 kg
Sampling date : 04/07/2020
Product : Sprouted Mung Beans
Requirement : Drying
Start Date test : 04/07/2020
End Date test : 04/07/2020

LABORATORY EXPERIMENTAL SET UP:



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

LAB BATCH MICROWAVE+CONVECTION HEATING SYSTEM SPECIFICATIONS:

Microwave Power	1.45 kW(CW)
Frequency	2450 MHz \pm 50
Infra-red Power	4 kW
Microwave Exposure Zone (Cavity)	1000 mm length wise
Web width	380mm
Entry Vestibule length	1200mm
Exit Vestibule Length	1200 mm
Exhaust Power	0.5 HP

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (degree C)	29°C (\pm 5°C)
Humidity (%)	\leq 82% 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.






EUROPE ASSOCIATION of Manufacturers and Suppliers

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

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
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
Moisture Analyzer		Make: Axis Balance Description: Moisture range: 1%(sample 0.02/0.05g), 0.1% (Sample 0.5/5g), 0.01%(Sample>5g)

SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on given sample of Sprouted Mung Beans to speed up the heating rate for drying treatment. For this experimental run, given product has been placed in Continuous Microwave Hybrid Heating System and microwave+IR exposure has been given with suitable parameters. The observations are made on the basis of temperature on product, total weight loss, final moisture content and any damage to product samples.

Also, the observations are made after every 1 pass of 10.5 minutes on the basis of LOD method by checking weight loss. Also, initial weight before drying and final weight after drying was taken.

Format: F/R&D/01



EUROPE ASSOCIATION of Manufacturers and Suppliers



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

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: 1.3 kW

Infrared Heater Temperature: 70°C

Initial Moisture Content: 67.7%

Initial Weight: 2 kg

Sr. No.	Time (minutes)	Final Wt. (kg)	Total Wt. Loss (gm)	Surface Temp. (°C)	Remarks
1.	After 1 st pass	1.639	361	65	Drying rate started
2.	After 2 nd pass	1.319	320	70	Drying phase continues
3.	After 3 rd pass	1.041	279	70	Variant of Drying rate
4.	After 4 th pass	0.842	198	70	Variant of Drying rate
5.	After 5 th pass	0.714	128	70	Variant of Drying rate
6.	After 6 th pass	0.663	51	70	Dried

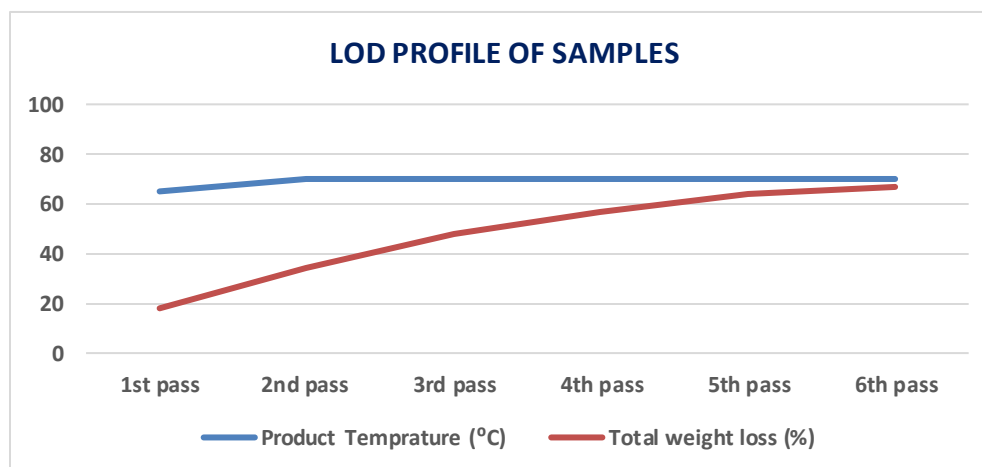
Total Time: 63 mins

Final Weight: 663 gm

Total Weight Loss: 1.337 kg

Final Moisture Content: 2.6%

GRAPHICAL REPRESENTATION OF DRYING PARAMETERS:



Format: F/R&D/01



EUROPEAN ASSOCIATION OF RESEARCHERS IN FOOD TECHNOLOGY



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

Kerone Research & Development Centre (KRDC)

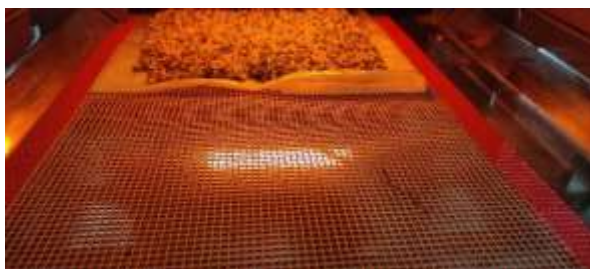
B/47, Addl. MIDC. Anand Nagar, Ambarnath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

MOISTURE ANALYSIS REPORTS:

Drying started		Drying started	
Date : 4-07-2020		Date : 4-07-2020	
File : 116/20/20		File : 116/20/20	
Model : A00000		Model : A00000	
Serial number : 130		Serial number : 130	
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 :	[(w0-w)/w0]*100%	Calculation :	[(w0-w)/w0]*100%
Finished :	1 sample	Finished :	1 sample
Initial weight :	1.750 g	Initial weight :	1.750 g
Final weight :	0.560 g	Final weight :	0.560 g
Drying time :	00:07:40s	Drying time :	00:07:40s
Sampling interval :	20 sec	Sampling interval :	20 sec
Moisture :	67.7 %	Moisture :	67.7 %
Initial Moisture Content		Final Moisture Content	

BEFORE AND AFTER PICTURES OF TREATED SPCIMEN SAMPLE:

1. Before Heat Treatment:



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.



EUROPEAN ASSOCIATION OF MICROPROCESSOR TECHNOLOGIES



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

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 Heat Treatment:



OBSRVATIONS:

The drying behavior of Sprouted Mung Beans has been investigated under the Microwave+IR 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. In the processed sample, as per physical investigation, it has been observed that there is change in colour on sample with required temperature on product.

Miss. Komal Bhoite
Tested By