



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 Heat Treatment  
for Sterilization of Coriander Powder**

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



EMITECH S.p.A. - Via Salaria 100 - 00198 Roma - Italy



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

<b>Customer :</b>	<b>M/s. Anil &amp; Company</b>
<b>Process :</b>	<b>Batch Microwave Heat Treatment for Sterilization of Coriander Powder</b>

### TEST REPORT No: 47/KRDC/LAB/17 Mum 24/07/2020

Date Sample reception : 19/07/2020

ID : 47/LAB/168

### SAMPLE DESCRIPTION:

Sampling : As Requested

Sample Condition : Acceptable

Quantity : 400 gm.

Sampling date : 24/07/2020

Product : Coriander Powder

Requirement : Sterilization & no damage to bag

Start Date test : 24/07/2020

End Date test : 24/07/2020

### LABORATORY EXPERIMENTAL SET UP:



Format: F/R&D/01



Kerone Research &amp; 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 MICROWAVE HEATING SYSTEM SPECIFICATIONS:**

<b>Microwave Power</b>	3 kW(CW)
<b>Frequency</b>	2450 MHz $\pm$ 50
<b>Convective Power</b>	1.5 kW (air flow 350 l/min at 20°C)
<b>Microwave Exposure Zone (Cavity)</b>	650 mm x 650 mm x 400 mm
<b>Thermal Monitoring System</b>	Single Channel Fiber Optic: Range -40 to 250°C
<b>Exhaust Power</b>	1HP
<b>Turntable Size</b>	Ø 550 mm

**ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:**

<b>Temperature (degree C)</b>	30°C ( $\pm$ 5°C)
<b>Humidity (%)</b>	$\leq$ 78% RH
<b>Pressure (kN/m2 or kPa)</b>	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.



EMITECH S.p.A. - Via S. Rocco 10 - 20139 Milano (Italy)



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

## EQUIPMENTS USED:

Name of Equipment	Picture of Equipment	Specifications
Compact Thermal Imaging Camera		<b>Model: FLIR E-30</b> <b>Resolution: 160x 120</b> <b>IR Thermal sensitivity of 0.10°C</b>
Thermo Hygrometer		<b>Model No: HTC-2</b> <b>Temperature accuracy: <math>\pm^{\circ}\text{C}</math> (1.8°F)</b> <b>Temperature resolution: 0.1°C (0.2°F)</b> <b>Humidity range: 10%~99% RH</b> <b>Humidity accuracy: <math>\pm 5\%</math> RH</b> <b>Humidity resolution: 1% RH</b>

## SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on given packed sample of coriander powder to speed up the heating rate for sterilization treatment. For this experimental run, given sample has been sealed packed in microwave transparent bags and placed inside batch microwave heating system to achieve sterilization treatment. The observations are made on the basis of temperature on product and any damage to sample and bag.





EMITECH ANALYTICAL LABORATORY



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

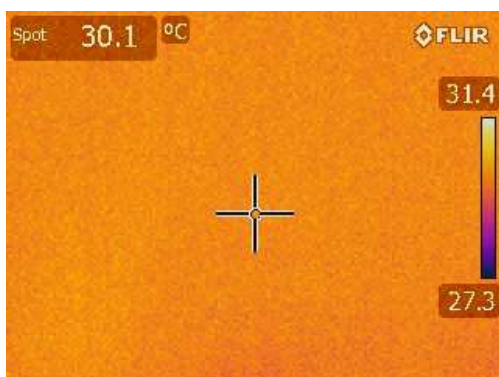
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

## ANALYTICAL RESULTS:

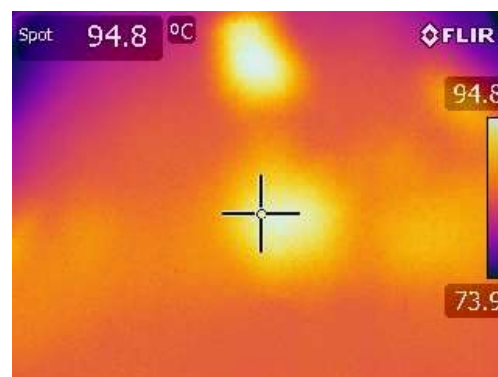
Sample quantity	MW Power (kW)	Time (minutes)	Temp. on product (°C)	Remarks
100 gm	0.870	7	70-75	No damage to bag
400 gm	1.16	3	75-80	No damage to bag
1 kg (A)	1.45	4	75-80	No damage to bag
1 kg (B)	1.45	5	80-85	No damage to bag
1 kg (C)	1.45	6	95-100	Bag burst from one side
5 kg	2.03	10	80-85	No damage to bag

## THERMAL IMAGE BEFORE AND AFTER HEAT TREATMENT:

Before Heat Treatment:



After Heat Treatment:



Format: F/R&D/01



EMITECH S.p.A. - Via S. Rocco 10 - 20139 Milano (Italy)



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

## BEFORE AND AFTER PICTURES OF TREATED SPECIMEN SAMPLE:

### 1) 100gm



### 2) 400gm



### 3) 1kg A



### 4) 1kg B



Format: F/R&D/01



EMITECH S.p.A. Via S. Rocco 10 - 20139 Milano - Italy



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

## 5) 1kg C



## 6) 5kg



## OBSRVATIONS:

The heating behavior of coriander powder and packaging material has been investigated under the microwave irradiation mode for sterilization treatment. As per physical investigation, it has been observed that there is no colour change in sample as well no deformation of bag except one bag which has 95-100°C surface temperature.

*K Komal*

Miss. Komal Bhoite  
Tested By