

Kerone Research & Development Centre (KRDC), B/47, Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India  
Tel- +91-251-2620542/13/44/45/46, Email-[info@kerone.com](mailto:info@kerone.com), [www.kerone.com](http://www.kerone.com)

Customer :	M/s L.T. FOODS LIMITED
Process :	Batch Vacuum Microwave Dehydrator Treatment for Drying of Boiled Toor dal

### TEST REPORT No: 47/KRDC/LAB/17 Mum 08/07/2021

Date Sample reception : 04/03/2021  
ID : 47/LAB/03

#### SAMPLE DESCRIPTION:

Sampling : As Requested  
Sample Condition : Acceptable  
Quantity : 40 kg  
Sampling date : 08/07/2021  
Product : Toor Dal  
Requirement : Final product must be cooked and dried fully  
Start Date test : 08/07/2021  
End Date test : 08/07/2021

#### LABORATORY EXPERIMENTAL SET UP:



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**LAB BATCH MICROWAVE HEATING SYSTEM SPECIFICATIONS:**

Magnetron Power Generator Rating	Air Cooled 1.45KW/2450+50 MHZ x 1 No.
Convection Power	1.5 KW
Total Heater Power	3KW (MW 1.45KW + Convection 1.5KW)
Supply Voltage required	230V 2Ph supply
MW Overall (LxWxH) in mm	620X670X640
Cavity Chamber (INNER) in mm	L-300 & Ø220
Vacuum Pump Rating	560W, 220V/50Hz, 2880rpm
Free Air Displacement	10.7 CFM
Vacuum Pump (LxWxH)	430x200x300

**ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:**

Temperature (degree C)	29.1°C (±5°C)
Humidity (%)	≤ 71% RH
Pressure (kN/m <sup>2</sup> 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: 160 x 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: $\pm^{\circ}\text{C}$ (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
Vertical Autoclave		Working Size: 12" dia x 12"ht Rating: 3.0K.W. Pressure Range: upto 2 kg/cm <sup>2</sup>

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### **SAMPLE PREPARATION AND METHOD/PROCEDURE:**

The experiment has been performed on cooked toor dal without adding any additive to speed up the drying rate. For this experimental run, toor dal has been partly cooked by steaming in vertical autoclave upto the pressure of 1 kg/cm<sup>2</sup> for 15-20 minutes. Later, this parboiled rice is placed on a tray in such a manner that it forms a uniform layer and kept in Batch Vacuum Microwave Dehydrator system. The observations are made after every 10 minutes. Also, initial weight before drying, weight after washing, weight after steaming, final weight after drying, initial moisture content, moisture content after washing, moisture content after steaming, final moisture content after treatment, and moisture content after cooking test, i.e., rehydration has been taken.

### **ANALYTICAL RESULTS:**

**Microwave Power: 0.6 kW (40% Capacity)**

**Heater: 60°C (switch 1)**

**Initial Sample Weight: 250 grams**

**Initial Moisture Content: 5.1%**

**Weight after Parboiling: 468 grams**

**Moisture Content after parboiling: 55.3%**

Sr. No.	Time (minutes)	Weight noted (grams)	Total weight loss(grams)	Total weight loss( in % )	Remarks, if any
1.	After 10	286	182	39.88%	Drying rate started
2.	After 20	233	53	18.53%	Drying phase continue
3.	After 30	206	27	11.58%	Required Drying rate

**Sample weight after drying: 206 grams**

**Total weight loss on drying: 262 grams**

**Final Moisture Content: 3%**

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## MOISTURE ANALYSIS REPORTS:

Date : 0-07-2021  
Time : 11:57:05  
Model: AOS200  
Serial number : 130

Drying parameters

Product : 0

Drying temperature : 105.0 °C

Drying profile : standard  
Mode : Short mode  
Calculation :  $((w_0 - w)/w_0) \times 100\%$   
Finished : 3 samples

Initial weight : 1.537 g  
Final weight : 1.461 g  
Drying time : 00:10:40s  
Sampling interval : 20 sec  
Moisture : 5.1 %

NOTE Initial moisture of tur dal

The analysis performed by: 0

Signature: *Komal*

Date : 0-07-2021  
Time : 17:19:00  
Model: AOS200  
Serial number : 130

Drying parameters

Product : 0

Drying temperature : 105.0 °C

Drying profile : standard  
Mode : Short mode  
Calculation :  $((w_0 - w)/w_0) \times 100\%$   
Finished : 3 samples

Initial weight : 3.191 g  
Final weight : 1.427 g  
Drying time : 00:40:40s  
Sampling interval : 20 sec  
Moisture : 55.3 %

NOTE Moisture of Par Boiled tur dal.

The analysis performed by: 0

Signature: *Komal*

Drying started

Date : 0-07-2021  
Time : 17:33:17  
Model: AOS200  
Serial number : 130

Drying parameters

Product : 0

Drying temperature : 105.0 °C

Drying profile : standard  
Mode : Short mode  
Calculation :  $((w_0 - w)/w_0) \times 100\%$   
Finished : 3 samples

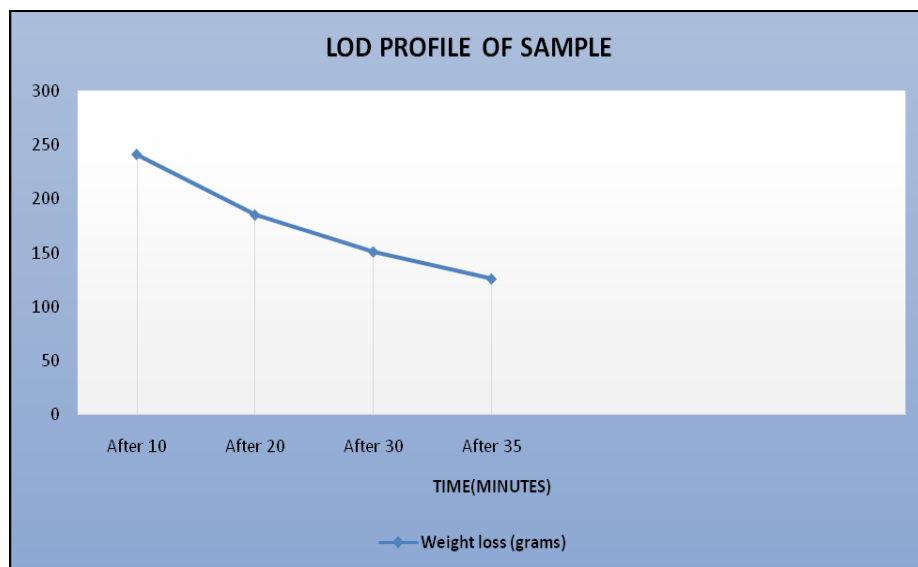
Initial weight : 0.341 g  
Final weight : 0.350 g  
Drying time : 00:02:40s  
Sampling interval : 20 sec  
Moisture : 3 %

NOTE final moisture of tur dal

The analysis performed by: 0

Signature: *Komal*

## GRAPHICAL REPRESENTATION OF DRYING PARAMETERS:



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### **BEFORE AND AFTER PICTURES OF TREATED SPECIMEN SAMPLE**



**UNTREATED TOOR DAL**

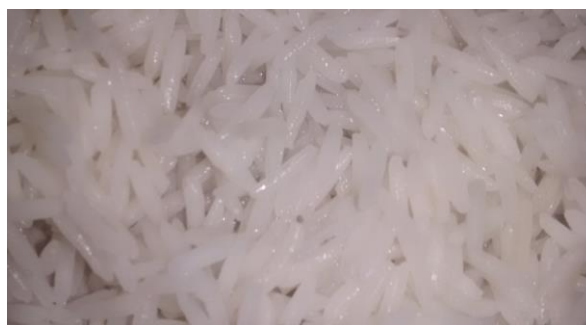


**COOKED TOOR DAL**



**TREATED TOOR DAL**

**REHYDRATION TEST:** For cooking test, little amount of treated sample has been taken in a mug and then boiled water is added to it and covered it for 3-4 minutes followed by stirring.



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## MOISTURE GAINED AFTER COOKING TEST:

Model	: KRDC001
Serial number	: 170
Drying parameters	
Product	: 0
Drying temperature	: 105.0 °C
Drying profile	: standard
Mode	: Short mode
Calculation	: $((w_0 - w)/w_0) \times 100\%$
Finished	: 3 samples
Initial weight	: 0.371 g
Final weight	: 0.757 g
Drying time	: 00:41:00s
Sampling interval	: 20 sec
Moisture	: <u>68.1 %</u>
NOTE Final moisture of Rehydrated Rice	
The analysis performed by: 0	
Signature: <u>Komal</u>	

**Moisture of Rehydrated Toor dal is- 68.1%**

## OBSERVATIONS:

The Drying behavior of parboiled toor dal has been investigated under the vacuum microwave dehydrator. 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 in drying time. As per physical investigation, it has been observed that there is crunchiness in texture without burning and the bright yellow colour changes to pale yellow after treatment.



**Ms. Komal Ingle**

**Tested By**

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