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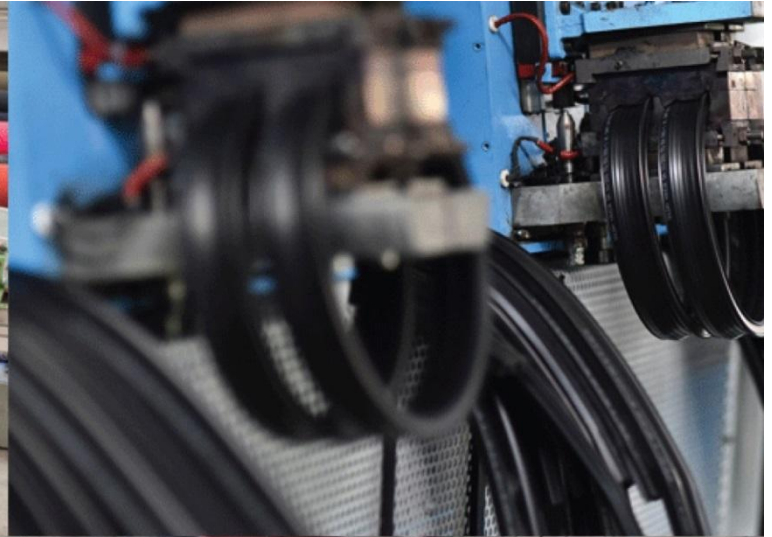
A.M.P.E.R.E (EUROPE)

In Association With



ELECTRO MAGNETIC innovative technologies

Kerone Research & Development Centre (KRDC),  
B/47, Adl. 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 Convection Heat Treatment for  
Dehydration of Paneer**





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Customer :	M/s. Daksh Impex
Process :	Batch Convection Heat Treatment for Dehydration of Paneer

**TEST REPORT No: 47/KRDC/LAB/17 Mum 02/09/2020**

Date Sample reception : 02/09/2020  
ID : 47/LAB/177

**SAMPLE DESCRIPTION:**

Sampling : As Requested  
Sample Condition : Acceptable  
Quantity : 1 No.  
Sampling date : 02/09/2020  
Product : Paneer  
Requirement : Final Moisture should be around 20%  
Start Date test : 02/09/2020  
End Date test : 02/09/2020

**LABORATORY EXPERIMENTAL SET UP:**



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#### LAB BATCH CONVECTION HEATING SYSTEM SPECIFICATIONS:

<b>Heating Zone (width*height*depth)</b>	550*650*550 mm
<b>No. of Heaters</b>	4
<b>Total Heater Power</b>	3 kW
<b>Motor</b>	0.5 HP
<b>No. of trays</b>	7
<b>Tray size (width*height*depth)</b>	600500 X 35
<b>Nominal Capacity of Dehumidifier</b>	1 tr each

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<b>Humidity Range of Dehumidifier</b>	20-90%
<b>Max. Ambient Temperature of Dehumidifier</b>	40°C
<b>Water Removal Rate of Dehumidifier</b>	80 lt per day at NTP

**ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:**

<b>Temperature (°C)</b>	31°C (±5°C)
<b>Humidity (%)</b>	≤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

**EQUIPMENTS USED:**

Name of Equipment	Picture of Equipment	Specifications
<b>Compact Thermal Imaging Camera</b>		<b>Model: FLIR E-30</b> <b>Resolution: 160x 120</b> <b>IR Thermal sensitivity of 0.10°C</b>
<b>Moisture Analyzer</b>		<b>Make: Axis Balance</b> <b>Description:</b> <b>Moisture range: 1%(sample 0.02/0.05g), 0.1% (Sample 0.5/5g), 0.01%(Sample&gt;5g)</b>

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<p><b>Thermo Hygrometer</b></p>		<p><b>Model No: HTC-2</b> <b>Temperature accuracy: ±°C (1.8°F)</b> <b>Temperature resolution: 0.1°C (0.2°F)</b> <b>Humidity range: 10%~99% RH</b> <b>Humidity accuracy: ±5% RH</b> <b>Humidity resolution: 1% RH</b></p>
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**SAMPLE PREPARATION AND METHOD/PROCEDURE:**

The experiment has been performed on Paneer to speed up the drying rate. For this experimental run, given Paneer sample has been diced in uniform cubes of about 15-20 mm and these cubes has been placed in a perforated tray in such a manner that none of the pieces are touching and there is some space around each piece for air to circulate for achieving even drying characteristics. Observations are made after every 15 minutes on LOD basis. Also, initial and final moisture content has been taken.

**ANALYTICAL RESULTS:**

**Setting Temperature: 65°C**

**Initial Weight: 250 grams**

**Initial Moisture Content: 50.3%**

Sr. No.	Time (minutes)	Weight noted (grams)	Weight loss (%)	Temperature on sample (°C)	Remarks, if any
1.	After 15	230	8	48	Drying rate started
2.	After 30	212	15.2	49	Drying phase continue
3.	After 45	204	18.4	50	Variant of Drying rate
4.	After 60	199	20.4	52	Variant of Drying rate
5.	After 75	194	22.4	53	Variant of Drying rate
6.	After 90	191	23.6	55	Required Drying rate

**Final Weight: 191 grams**

**Total Weight Loss: 23.6%**

**Final Moisture Content: 21.2%**

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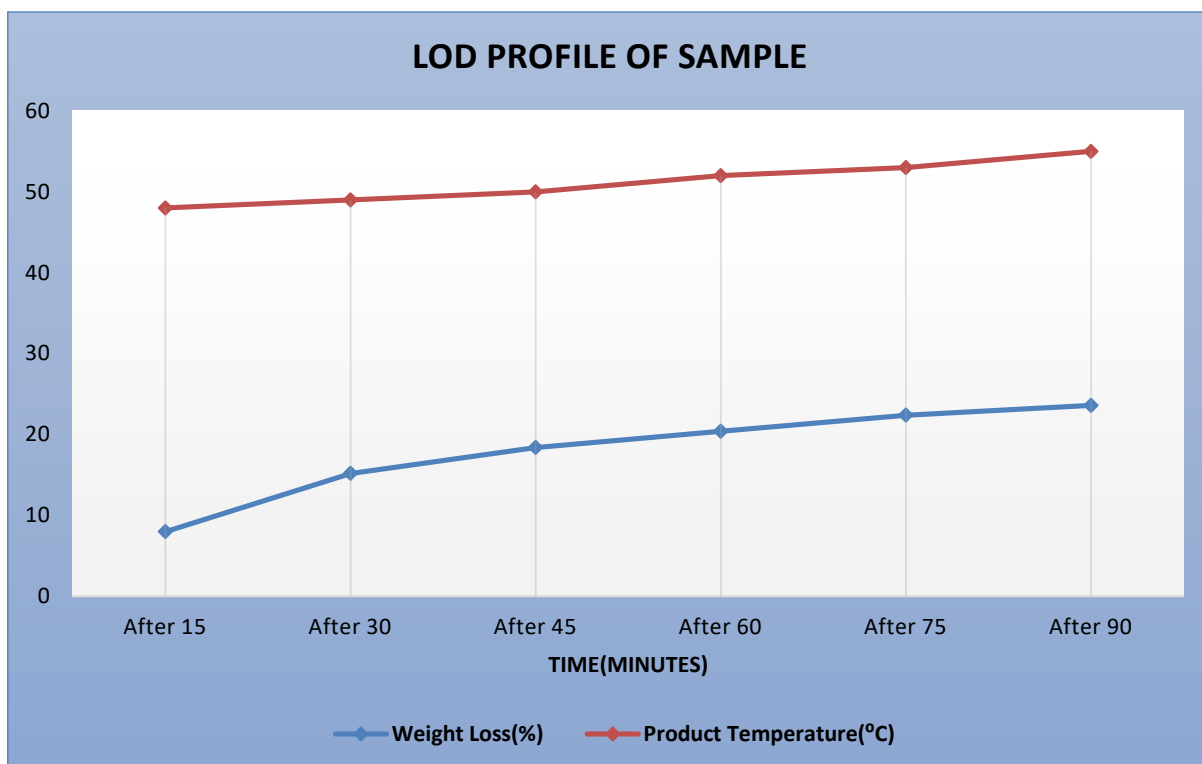


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### GRAPHICAL REPRESENTATION OF DRYING PARAMETERS:



### THERMAL IMAGE BEFORE AND AFTER HEAT TREATMENT:

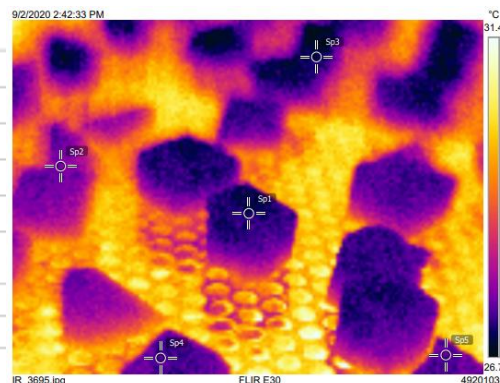
#### 1. Before Heat Treatment:

##### Measurements

Sp1	27.0 °C
Sp2	27.6 °C
Sp3	27.0 °C
Sp4	27.4 °C
Sp5	27.4 °C

##### Parameters

Emissivity	0.95
Ref. temp.	20 °C



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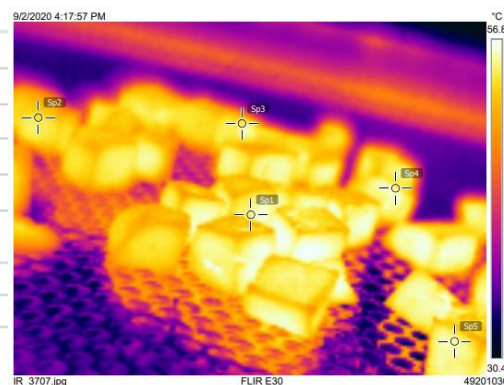
## 2. After Heat Treatment:

### Measurements

Sp1	55.2 °C
Sp2	53.6 °C
Sp3	54.7 °C
Sp4	54.7 °C
Sp5	55.3 °C

### Parameters

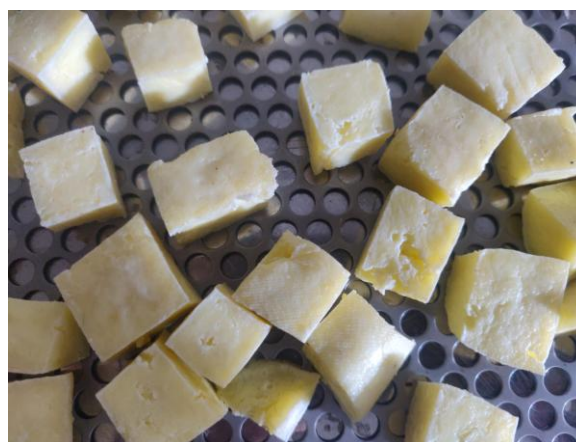
Emissivity	0.95
Refl. temp.	20 °C



## BEFORE AND AFTER PICTURES OF TREATED SPECIMEN SAMPLE:



BEFORE



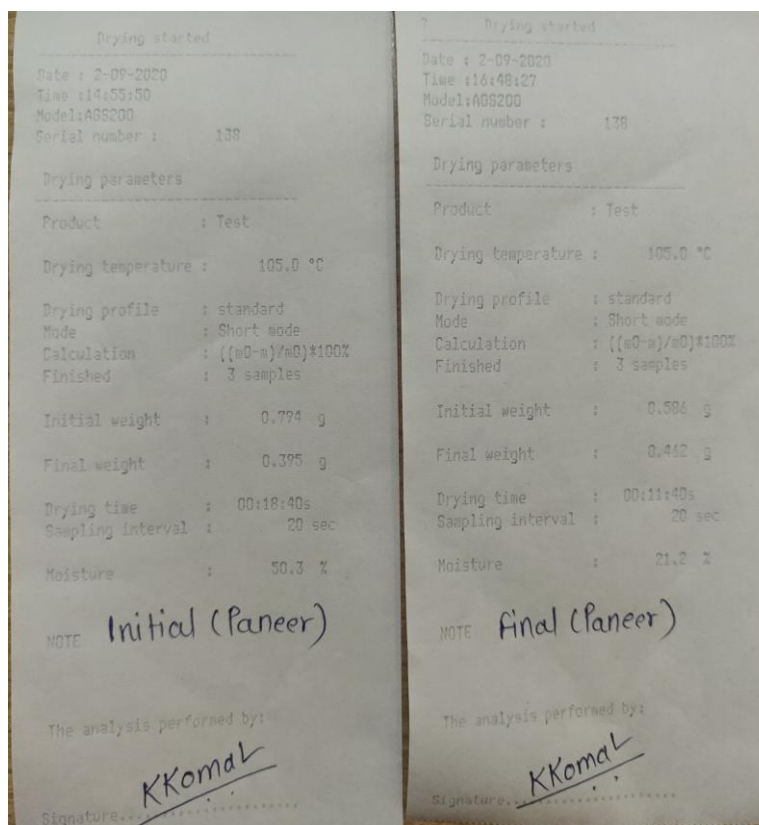
AFTER

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### MOISTURE ANALYSIS REPORTS:



### OBSERVATIONS:

The drying behavior of Paneer has been investigated under the convection heating system. The drying rate is found to be increasing with respect to increase in 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 required moisture content has been achieved with little colour change in final product.

Miss Komal Bhoite  
Tested By