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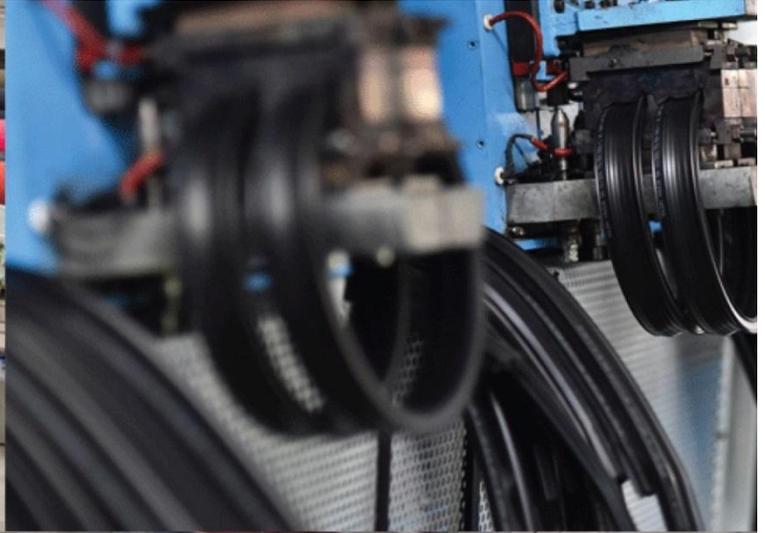
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Kerone Research & Development Centre (KRDC),
B/47, Addl. MIDC. Anand Nagar, Ambarnath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com



**Batch Microwave+Convection Heat
Treatment for Drying of Wheat & Water
Slurry**



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Customer :	M/s. Dhaval Distil Evap Private Limited
Process :	Batch Microwave+Convection Heat Treatment for Drying of Wheat &Water Slurry

TEST REPORT No: 47/KRDC/LAB/17 Mum 01/12/2018

Date Sample reception : 01/12/2018
ID : 47/LAB/67

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : 1 kg
Sampling date : 01/12/2018
Product : Wheat flour
Requirement : Final product must have moisture content less than 5%
Start Date test : 01/12/2018
End Date test : 01/12/2018

LABORATORY EXPERIMENTAL SET UP:



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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)	28.5°C (\pm 5°C)
Humidity (%)	\leq 65% RH
Pressure (kN/m² 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: 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: ±°C (1.8°F) Temperature resolution: 0.1°C (0.2°F) Humidity range: 10%~99% RH Humidity accuracy: ±5% RH Humidity resolution: 1% RH

SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on wheat flour with adding water to speed up the drying rate. For this experimental run, 350 grams of wheat flour has been taken and then water has been added till the mixture become 1 kg by weight. This slurry on microwave transparent tray with uniform thickness of about 5 mm has been placed in heating system with suitable setting parameters. The observations are made after every 30 minutes. Also, moisture content and temperature on product has been noted for each time interval.

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ANALYTICAL RESULTS:

Initial Moisture Content Of slurry: 55.8%

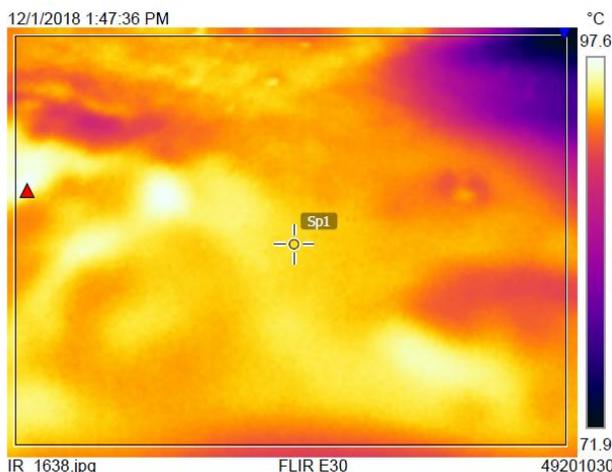
	Trial No. 1	Trial No. 2	Trial No. 3
Microwave Power (kW)	1	1	0.7
Setting Temperature (°C)	90	90	70
Cycle Time (minutes)	60	90	(90+)15
Temperature on Product (°C)	89-95	122-140	105-115
Moisture Content (%)	29.9	-	0.9
Observations	Upper surface is dried, while inner contained some moisture	Burning effect observed	Completely dried with some burning effect

Note: Trial 3 is continuation of trial 2 with low temperature and intensity.

THERMAL IMAGE AFTER HEAT TREATMENT:

1. After Trial No.1:

Measurements		
Bx1	Max	97.9 °C
	Min	72.5 °C
	Average	93.3 °C
Sp1		94.9 °C
Parameters		
	Emissivity	0.95
	Refl. temp.	20 °C



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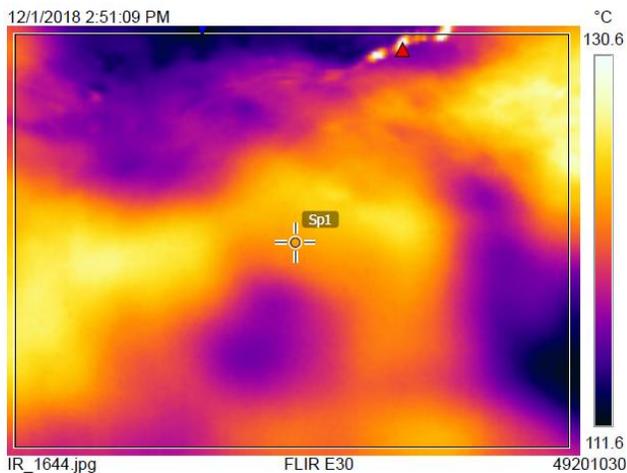
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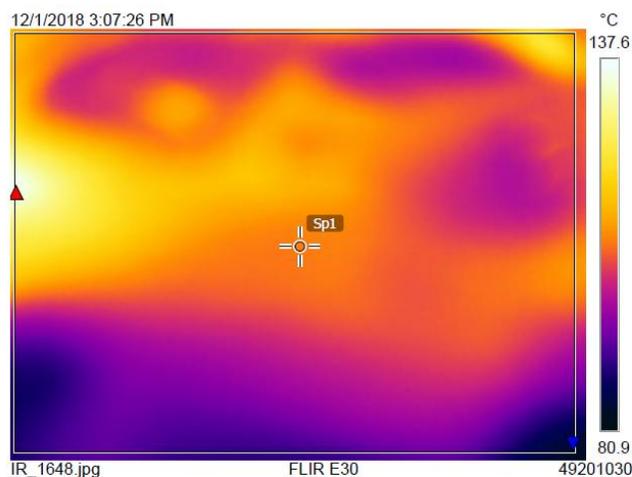
2. After Trial No. 2:

Measurements		
Bx1	Max	140.4 °C
	Min	111.5 °C
	Average	120.7 °C
Sp1		123.2 °C
Parameters		
Emissivity		0.95
Refl. temp.		20 °C



3. After Trial No. 3:

Measurements		
Bx1	Max	135.9 °C
	Min	84.0 °C
	Average	107.8 °C
Sp1		111.5 °C
Parameters		
Emissivity		0.95
Refl. temp.		20 °C



BEFORE AND AFTER PICTURES OF TREATED SPECIMEN SAMPLE:



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MOISTURE ANALYSIS REPORTS:

Drying started	
Date :	1-12-2018
Time :	14:44:51
Model:	AGS200
Serial number :	138
Drying parameters	
Product :	Test
Drying temperature :	105.0 °C
Drying profile :	standard
Mode :	Short mode
Calculation :	$((m0-m)/m0)*100\%$
Finished :	3 samples
Initial weight :	1.766 g
Final weight :	0.781 g
Drying time :	02:08:40s
Sampling interval :	20 sec
Moisture :	55.8 %
NOTE	Initial
The analysis performed by:	
Signature.....	<i>KKomal</i>

Drying started	
Date :	1-12-2018
Time :	15:03:52
Model:	AGS200
Serial number :	138
Drying parameters	
Product :	Test
Drying temperature :	105.0 °C
Drying profile :	standard
Mode :	Short mode
Calculation :	$((m0-m)/m0)*100\%$
Finished :	3 samples
Initial weight :	0.511 g
Final weight :	0.358 g
Drying time :	00:17:00s
Sampling interval :	20 sec
Moisture :	29.9 %
NOTE	After 1 hr
The analysis performed by:	
Signature.....	<i>KKomal</i>

Drying started	
Date :	1-12-2018
Time :	15:24:43
Model:	AGS200
Serial number :	138
Drying parameters	
Product :	Test
Drying temperature :	105.0 °C
Drying profile :	standard
Mode :	Short mode
Calculation :	$((m0-m)/m0)*100\%$
Finished :	3 samples
Initial weight :	1.029 g
Final weight :	1.020 g
Drying time :	00:01:40s
Sampling interval :	20 sec
Moisture :	0.9 %
NOTE	After 1 hr 45 min
The analysis performed by:	
Signature.....	<i>KKomal</i>

OBSRVATIONS:

The Drying behavior of wheat flour and water slurry 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 complete drying with crunchiness in texture, also colour change with burning effect due to continuous exposure of high temperature and intensity.

KKomal

Miss Komal Bhoite
Tested By

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