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Kerone Research & Development Centre (KRDC),
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Batch Microwave+Convection Heat Treatment for Drying of Wheat & Water Slurry

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

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Customer :	**Laboratory Experimental Analysis**
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 : 08/12/2018
Product : Wheat flour
Requirement : Final product must have moisture content less than 5%
Start Date test : 08/12/2018
End Date test : 08/12/2018

LABORATORY EXPERIMENTAL SET UP:

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LAB BATCH MICROWAVE+CONVECTION HEATING SYSTEM SPECIFICATIONS:

Microwave Power	2 kW(CW)
Frequency	2450 MHz ± 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)	28.1°C (±5°C)
Humidity (%)	≤63% 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, 150 grams of wheat flour has been taken and then 0.5 liter of water has been added to make a slurry. 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 Weight of Slurry: 624 grams

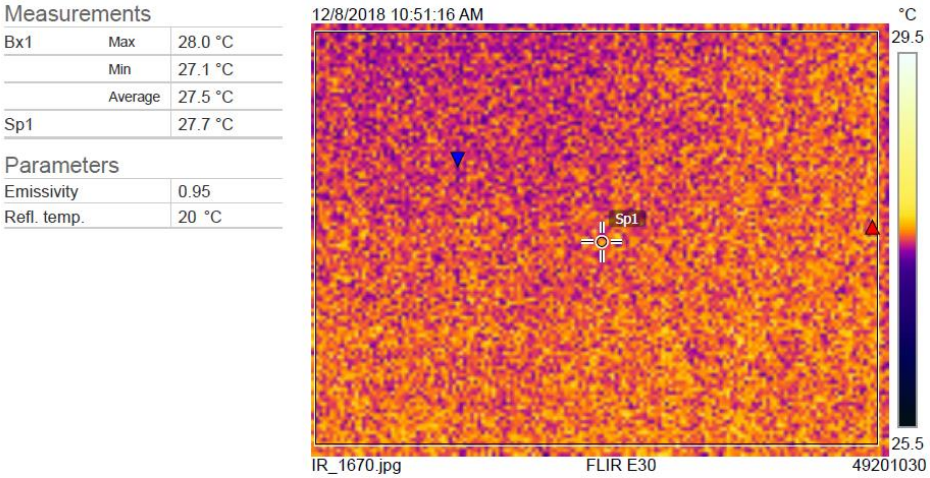
Initial Moisture Content Of slurry: 68.9%

Sr. No.	MW Power(kW)	Setting Temp(°C)	Time (minutes)	Weight Loss (%)	Remarks, if any
1.	1	90	After 30	19.57	Drying rate started
2.	1	90	After 60	51.92	Drying phase continue
3.	0.7	70	After 90	70.99	Variant of Drying rate
4.	0.7	70	After 120	76.6	Required Drying rate

Final Moisture Content: 2.6%

THERMAL IMAGE BEFORE AND AFTER HEAT TREATMENT:

1. Before Heat Treatment:



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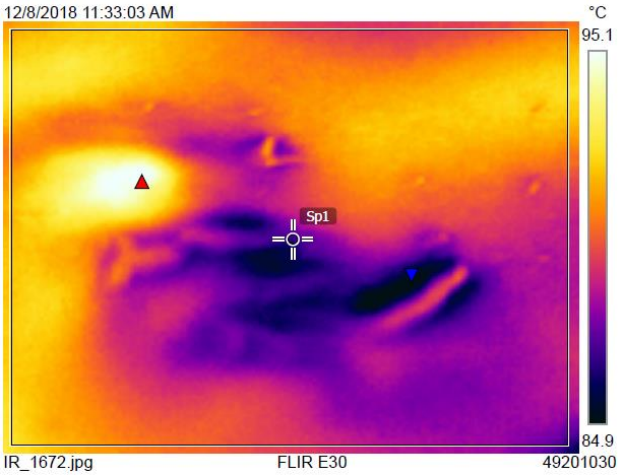
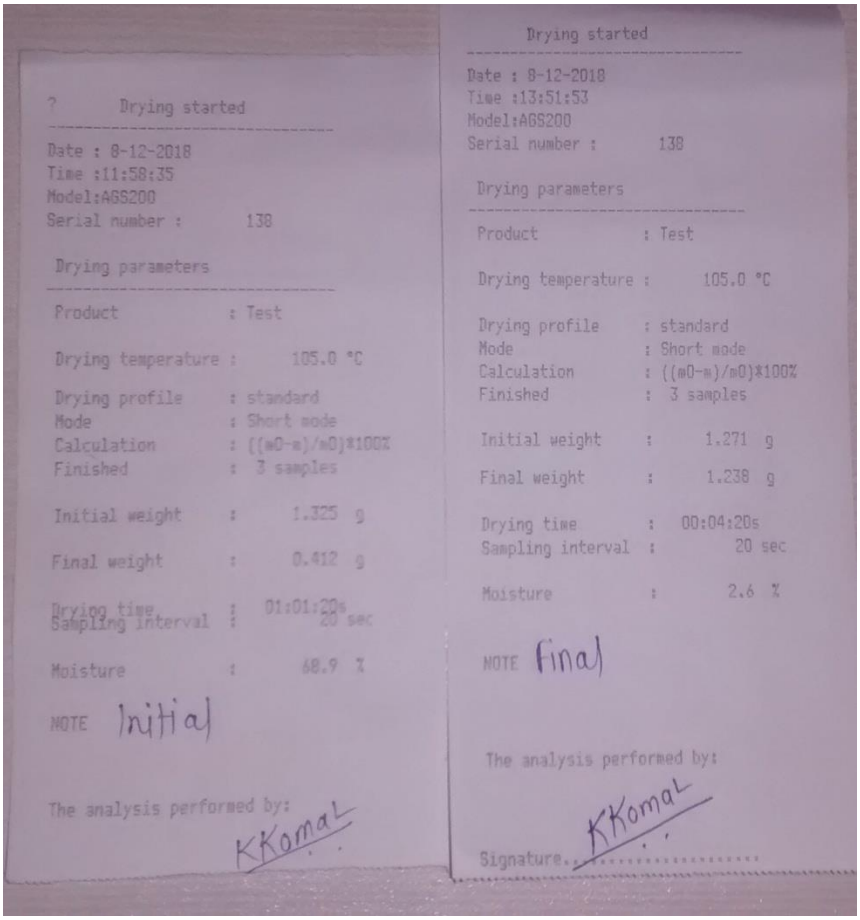
2. After Heat Treatment:

Measurements		
Bx1	Max	95.4 °C
	Min	84.4 °C
	Average	89.7 °C
Sp1		86.5 °C

Parameters	
Emissivity	0.95
Refl. temp.	20 °C



MOISTURE ANALYSIS REPORTS:



Drying started

Date : 8-12-2018
Time :11:58:35
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 : 1.325 g
Final weight : 0.412 g
Drying time : 01:01:20s
Sampling interval : 20 sec
Moisture : 68.9 %

NOTE Initial

The analysis performed by:
KKomal

Drying started

Date : 8-12-2018
Time :13:51:53
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 : 1.271 g
Final weight : 1.238 g
Drying time : 00:04:20s
Sampling interval : 20 sec
Moisture : 2.6 %

NOTE Final

The analysis performed by:
KKomal

Signature.....

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BEFORE AND AFTER PICTURES OF TREATED SPCIMEN SAMPLE:

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 and there is colour change without burning.

K Komal

Miss Komal Bhoite
Tested By