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Kerone Research & Development Centre (KRDC),
B/47, Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
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Batch IR Heat Treatment for Microbial Cellulose

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

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Customer :	**M/s. NANOLLOSE**
Process :	**Batch IR Heat Treatment for Pressed Nata De Coco (Microbial Cellulose)**

TEST REPORT No: 47/KRDC/LAB/17 Mum 13/07/2020

Date Sample reception : 15/05/2021
ID : 47/LAB/05

SAMPLE DESCRIPTION:

Sampling : As Requested
SampleCondition : Acceptable
Quantity : 4.85 Kgs.
Samples opening date : 12/07/2021
Product : Pressed Nata De Coco (Microbial Cellulose)
Start Date test : 13/07/2021
End Date test : 13/07/2021

LABORATORY EXPERIMENTAL SETUP:

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LAB BATCH CONVECTION HEATING SYSTEM SPECIFICATIONS:

Heating Zone (width*height*depth)	510*480*410 mm
No. of IR Heaters	2
Total Heater Power	3 kW
Motor	0.5 HP
No. of trays	6
Tray size (width*height*depth)	560 x 435 x25
Centrifugal Exhaust Blower	1440 rpm

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (^oC)	29^oC (±5^oC)
Humidity (%)	≤71% 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 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: ±°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

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SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on microbial cellulose for drying treatment. Before drying, analysis of the moisture content before treatment is done in order to observe and track the drying rate. For this experimental run, given sample has been placed on perforated tray inside IR oven at set temperatures and time cycles . After each cycle, moisture and weight of product is recorded. Once the required drying rate is attained, the product is left in oven for natural cooling with heaters turned "off".

ANALYTICAL RESULTS:

Initial wt. of Cellulose- 940g
Initial moisture of Cellulose- 76.3%
Setting Temperature: 70°C
Time Cycle: 1 Hr.

No. of cycles	Time cycle (mins)	Weight of product (grams)	Temp. on product (°C)	Moisture content (%)
1.	After 60mins	476	54.2	46.4
2.	After 120mins	315	54.3	30
3.	After 150mins	280	60.1	19.9
4.	After 180mins	230	62.5	7.6

Final wt. of Cellulose- 230g
Final moisture of Cellulose- 7.6 %

AFTER PICTURES OF TREATED SPECIMEN SAMPLE:

UNTREATED SAMPLE

TREATED SAMPLE

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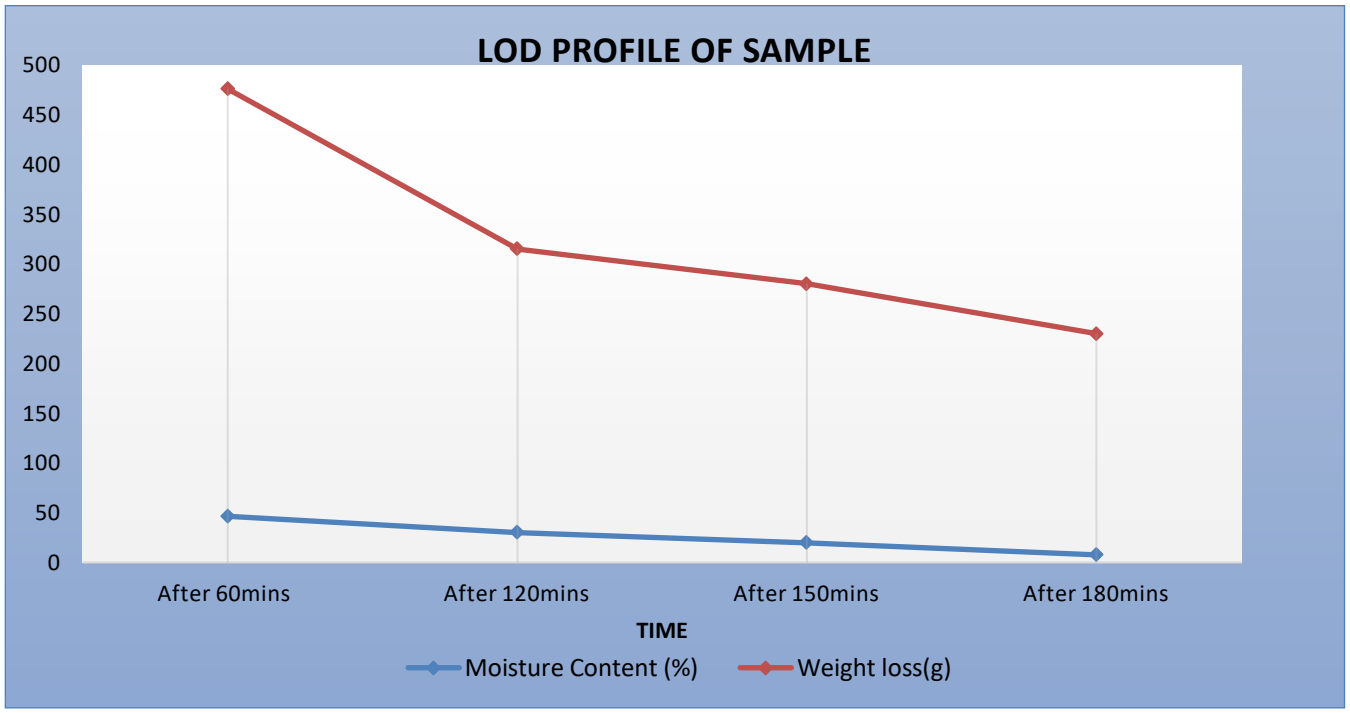
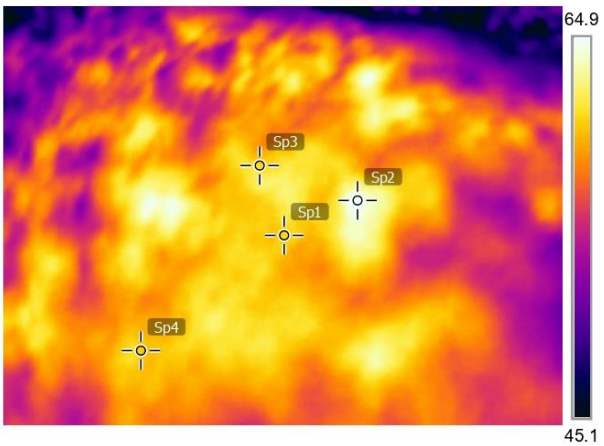
GRAPHICAL REPRESENTATION OF LOD :



THERMAL ANALYSIS REPORTS : AFTER 2ND CYCLE-

Measurements	
Sp1	61.0 °C
Sp2	65.4 °C
Sp3	61.3 °C
Sp4	60.7 °C

Parameters	
Emissivity	0.95
Refl. temp.	20 °C



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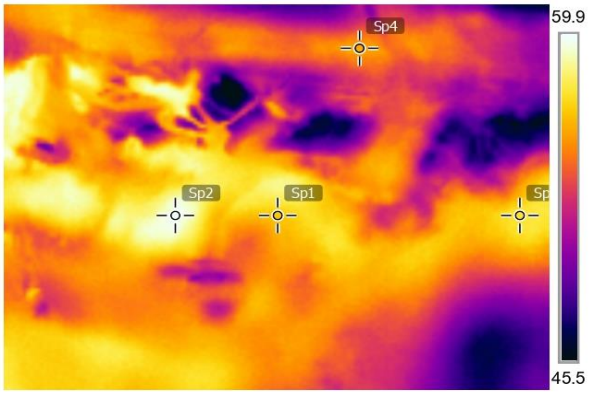
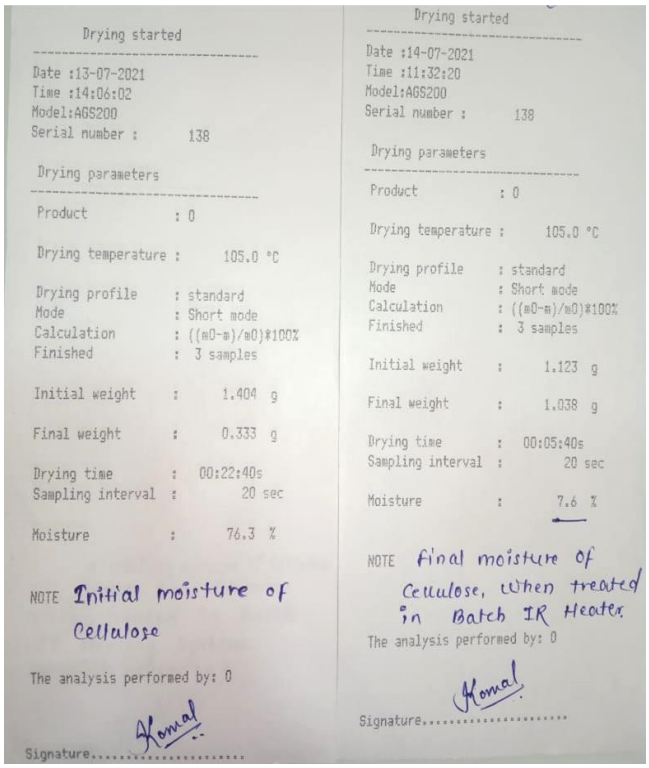
AFTER 3RD CYCLE

Measurements	
Sp1	56.5 °C
Sp2	59.7 °C
Sp3	57.6 °C
Sp4	56.0 °C

Parameters	
Emissivity	0.95
Refl. temp.	20 °C



MOISTURE ANALYSIS REPORTS:



Drying started

Date :13-07-2021
Time :14:06:02
Model:AGS200
Serial number : 138

Drying parameters

Product : 0

Drying temperature : 105.0 °C

Drying profile : standard
Mode : Short mode
Calculation : ((m0-m)/m0)*100%
Finished : 3 samples

Initial weight : 1.404 g

Final weight : 0.333 g

Drying time : 00:22:40s
Sampling interval : 20 sec

Moisture : 76.3 %

NOTE Initial moisture of Cellulose

The analysis performed by: 0

Signature.....

Drying started

Date :14-07-2021
Time :11:32:20
Model:AGS200
Serial number : 138

Drying parameters

Product : 0

Drying temperature : 105.0 °C

Drying profile : standard
Mode : Short mode
Calculation : ((m0-m)/m0)*100%
Finished : 3 samples

Initial weight : 1.123 g

Final weight : 1.038 g

Drying time : 00:05:40s
Sampling interval : 20 sec

Moisture : 7.6 %

NOTE Final moisture of Cellulose, when treated in Batch IR Heater

The analysis performed by: 0

Signature.....

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OBSERVATIONS:

The drying behavior of microbial cellulose has been investigated under the batch IR 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 product is dried without any burns but colour changes slightly off white.

Ms. Komal Ingle
Tested By