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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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Continuous Infra-Red Heat Treatment on Calcium Carbonate

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Customer :	**M/s. Himachal Polyolefins Limited**
Process :	**Continuous Infra-Red Heat Treatment on Calcium Carbonate**

Test Report No*: *162/KRDC/LAB/17 Mum 07/12/2022

Date Sample reception : 06/12/2022
ID : 162/LAB/07

***Sample Description*:**

Sampling : As Requested
Sample Condition : Acceptable
Sampling date : 06/12/2022
Product : Calcium Carbonate
Start Date test : 06/12/2022
End Date test : 06/12/2022

Laboratory Experimental System –

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System Specifications -

IR Medium Wave Emitters	6 Nos (-each having 0.5 kW, 445 mm heatinglength)
Short Wave IR Emitter withspecial reflectors	6 Nos (-each having 1 kW, 406 mm heatinglength)
IR Emitter to Object Distance	120 mm (- in medium wave zone)
IR Emitter to Object Distance	100 mm (- in short wave zone)
Overall IR Heating Zonelength	1400 mm
Web width	400 mm
IR wavelength range	0.7 to 10 microns
Direct Exposure of MW IR	500 mm
Direct Exposure of SW IR	750mm
Temperature Range	0-400ºC

Laboratory's Environmental Conditions –

Temperature (degree C)	29.4ºC (±5ºC)
Humidity (%)	≤50% 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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Equipment 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**
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**
Moisture Analyzer		**Make: Axis Balance** **Description:** **Moisture range: 1%(sample 0.02/0.05g), 0.1% (Sample 0.5/5g), 0.01%(Sample>5g)**

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Procedure of the Experiment -

- The experiment was performed on Calcium Carbonate to speed up the heating rate.
- For this experimental run, the powder sample was mixed in water to form a slurry (200gm solid + 250 ml water).
- The slurry sample was placed in the IR heating system with suitable parameters.
- After the heating treatment, the sample was analyzed.

Analytical Results:

Trial 2

Initial weight: 450gms
Initial Moisture: 55.7%

Cycles	Initial Moisture (%)	Cycle Time	Specifications of Microwave	Final Moisture (%)	Remark
1	55.7	After 7 mins 30 sec	IR intensity:100%; Set temp: 150ºC; Belt speed: 1 rpm	41.0	Drying started On product temp: (45-50)˚C
2	41.0	After 15 mins	IR intensity:100%; Set temp: 150ºC; Belt speed: 1 rpm	30.0	Drying continuous On product temp: (50-52)˚C
3	30.0	After 22 mins 30 sec	IR intensity:100%; Set temp: 150ºC; Belt speed: 1 rpm	6.5	Drying Variants On product temp: (55-60)˚C
4	6.5	After 30 mins	IR intensity:100%; Set temp: 150ºC; Belt speed: 1 rpm	1	Drying Variants On product temp: (58-62)˚C
5	1	After 37 mins 30 sec	IR intensity:100%; Set temp: 150ºC; Belt speed: 1 rpm	1.1	Drying Variants On product temp: (70-75)˚C
7	1.1	After 45 mins	IR intensity:100%; Set temp: 150ºC; Belt speed: 1 rpm	0.8	Dried as desired On product temp: (80-87)˚C

Final weight: 195gms
Final Moisture: 0.8%

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Trial images:

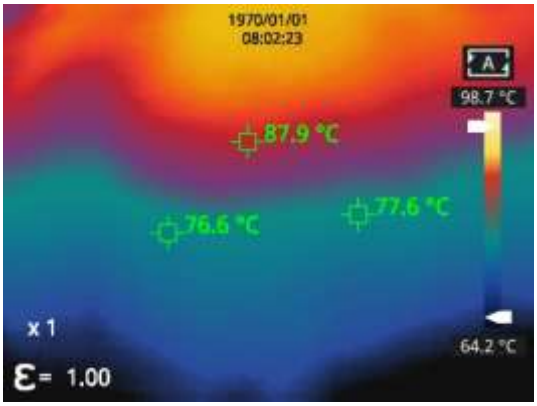
Untreated Sample

Treated Sample

Thermal Images:

Measurements	
Sp1	87.9°C
Sp2	77.6°C
Sp3	76.6°C

Parameters	
Emissivity	1.00
Temp.	98.7°C



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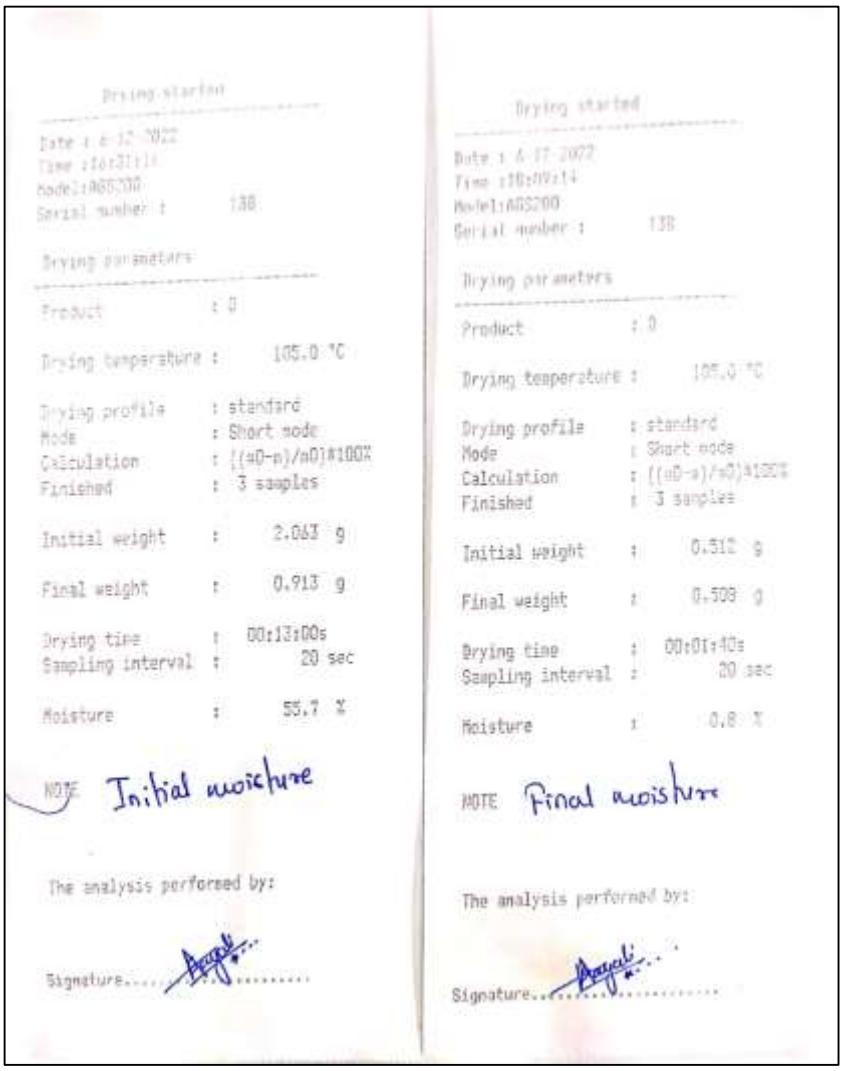
Moisture Analysis Report:



Drying started

Date : 6.12.2022
Time :10:31:14
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 : 2.063 g
Final weight : 0.913 g
Drying time : 00:13:00s
Sampling interval : 20 sec
Moisture : 55.7 %

NOTE Initial moisture

The analysis performed by:

Signature.....

Drying started

Date : 6.12.2022
Time :10:09:14
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 : 0.512 g
Final weight : 0.509 g
Drying time : 00:01:40s
Sampling interval : 20 sec
Moisture : 0.8 %

NOTE Final moisture

The analysis performed by:

Signature.....

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Observations:

The heating behavior of Dehydrated Fruit was investigated under the Microwave heating system. The heating rate was found to be increasing with respect to the increase in time. As per the physical investigation, it was observed that the puffing and drying of the product were obtained as desired.

Ms. Sayali Asole
(Tested By)