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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 Microwave Heat Treatment on Calcium Carbonate

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Customer :	**M/s. Himachal Polyolefins Limited**
Process :	**Batch Microwave Heat Treatment on Calcium Carbonate**

Test Report No*: *161/KRDC/LAB/17 Mum 07/12/2022

Date Sample reception : 06/12/2022
ID : 161/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 -

Microwave Power	2 KW (CW)
Frequency	2450 MHz ± 50
Convective Power	3.5 KW (airflow 350 I/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	1 HP
Tray size (width*height*depth)	450*950*50 mm

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 MW heating system with suitable parameters.
- After the heating treatment, the sample was analyzed.

Analytical Results:

Trial 1

Initial weight: 450gms
Initial Moisture: 55.7%

Cycles	Initial Moisture (%)	Cycle Time	Specifications of Microwave	Final Moisture (%)	Remark
C1	55.7	After 5mins.	MW Powde:1.5kW; Set temp: 100ºC	36.8	Water evaporation initiated On product temp: (80-85)˚C
C2	36.8	After 15mins.	MW Powde:1.5kW; Set temp: 100ºC	9.7	Cake formation On product temp: (80-90)˚C
C3	9.7	After 25mins.	MW Powde:1.5kW; Set temp: 100ºC	1.5	Cake drying started On product temp: (90-95)˚C
C4	1.5	After 35mins.	MW Powde:1.5kW; Set temp: 100ºC	0.5	Dried as desired On product temp: (95-99)˚C

Final weight: 193gms
Final Moisture: 0.5%

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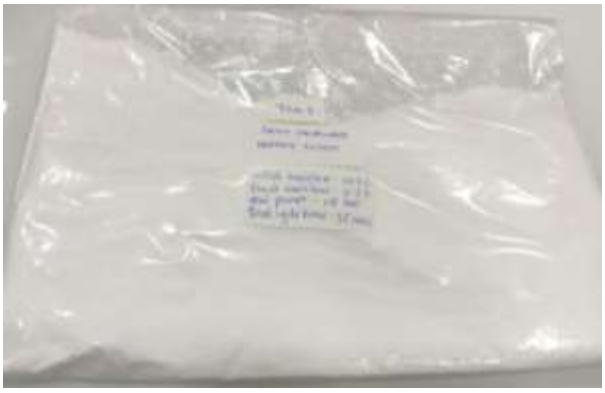
Trial images:

Untreated Sample

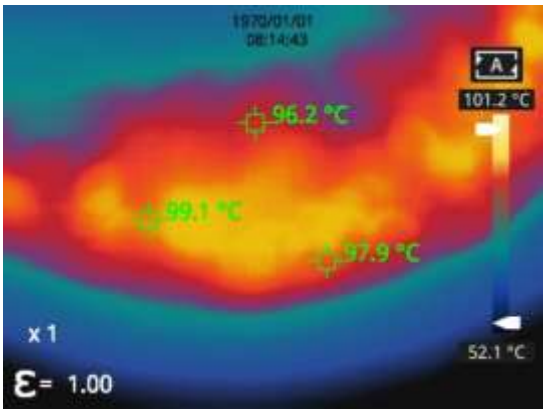


Treated Sample

Thermal Images:

Measurements	
Sp1	96.2°C
Sp2	97.9°C
Sp3	99.1°C

Parameters	
Emissivity	1.00
Temp.	101.2°C



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Moisture Analysis Report:

Drying started

Date : 6-12-2022
Time :16:31:16
Model:ABS200
Serial number : 130

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 : 2.083 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 :17:38:03
Model:ABS200
Serial number : 130

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 : 1.058 g
Final weight : 1.053 g
Drying time : 00:02:00s
Sampling interval : 20 sec
Moisture : 0.5 %

NOTE Final moisture

The analysis performed by:

Signature.....

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Observations:

The heating behavior of Calcium Carbonate 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 a moisture content below 1% was obtained as desired.

Ms. Sayali Asole
(Tested By)