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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+Convection Heat Treatment for Drying of Magnesium Dioxide Powder

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

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Customer :	**M/s. Baidyanath Minerals Pvt Ltd**
Process :	**Batch Microwave+Convection Heat Treatment for Drying of MnO_2 Powder**

TEST REPORT No: 47/KRDC/LAB/17 Mum 22/12/2020

Date Sample reception : 03/11/2020
ID : 47/LAB/185

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : 1 Nos. Bag
Sampling date : 22/01/2020
Product : Magnesium Dioxide Powder
Requirement : Final product must have moisture content less than 2%
Start Date test : 22/11/2020
End Date test : 22/11/2020

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^{o}C)
Microwave Exposure Zone (cavity)	1 cubic meter
Mode Stirrer	One
Thermal Monitoring System	Single Channel Fiber Optic: Range -40 to 250^{o}C
Exhaust Power	1HP
Tray Size	450x950x50 mm

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (degree C)	30^{o}C (±5^{o}C)
Humidity (%)	≤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 Magnesium Dioxide Powder to speed up the drying rate. For this experimental run, given sample has been placed in microwave transparent tray with 30 mm thickness of layer for drying with suitable setting parameters. Also, initial moisture content before drying, final moisture content after drying has been taken.

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ANALYTICAL RESULTS:

1. **Trial No. 1:**

   Microwave Power: 2 kW

   Setting Temperature: 100°C

   Initial Weight: 1kg powder+120ml water

   Moisture Content before adding water: 1.9%

   Moisture Content after adding water: 11.1%

Sr. No.	Time (minutes)	Weight noted (grams)	Final Moisture Content (%)	Temperature on sample(°C)	Remarks, if any
1.	After 10	1076	0.86	145-150	Required Drying Rate Achieved

2. **Trial No. 2:**

   Microwave Power: 2 kW

   Setting Temperature: 150°C

   Initial Weight: 1kg powder+120ml water

   Moisture Content before adding water: 1.9%

   Moisture Content after adding water: 11.7%

Sr. No.	Time (minutes)	Weight noted (grams)	Final Moisture Content (%)	Temperature on sample(°C)	Remarks, if any
1.	After 8	1084	0.9	155-160	Required Drying Rate Achieved

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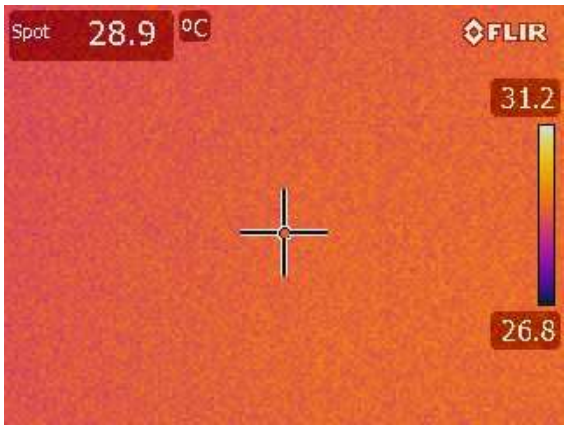
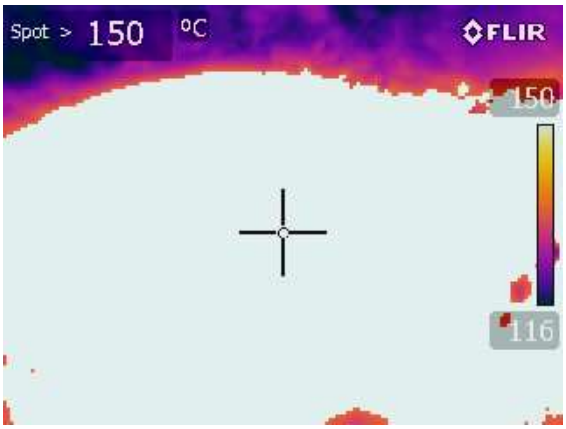
THERMAL IMAGE BEFORE AND AFTER HEAT TREATMENT:

Before Heat Treatment:



After Heat Treatment:



BEFORE AND AFTER PICTURES OF TREATED SPECIMEN SAMPLE:

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OBSRVATIONS:

The Drying behavior of Magnesium Dioxide Powder has been investigated under the Batch Microwave+Convection Heating System. The drying rate is found to be increasing with respect to increasing drying temperature. It has been found that the moisture content on the dry basis (%) decreases with respect to decreases in drying time. As per physical investigation, it has been observed that there is no colour change in sample with required final moisture content.

Miss. Komal Bhoite
Tested By