KERONE

A CRISIL-NSIC RATED COMPANY
ISO-9001-2008COMPANY

MemberOf

AIMCAL(USA) A.M.P.E.R.E(EUROPE)

In AssociationWith

EMitech
ELECTRO MAGNETIC Innovative Technologies

Kerone Research & Development Centre (KRDC),
B/47, Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

ROTARY IR HEATING SYSTEM FOR DRYING OF BENTONITE GRANULES

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

Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

Customer :	**M/s. Ashapura Group.**
Process :	**Rotary IR Heating System for drying of Bentonite Granules**

TEST REPORT No: 56/KRDC/LAB/17 Mum 10/03/2022

Date Sample reception : 05/03/2022
ID : 56/LAB/10

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : 5kg of Bentonite Granules (treated 3kg)
Sampling date : 08/03/2022
Product : Bentonite Granules of 0.4-3mm size.
Requirement : Moisture content less than 1%
Start test Date : 08/03/2022
End test Date : 10/03/2022

LABORATORY EXPERIMENTAL SETUP:

Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

LAB ROTARY IR HEATING SYSTEM SPECIFICATIONS:

Infrared Power	5 kW
Type of Infrared Emitters	Quartz Infrared
Rotary Drum Size	Φ324 mm x 800 mm long x 3mm Thk.
Thermal Monitoring System	Single Channel Fiber Optic: Range -40 to 250^{o}C
Exhaust	Exhaust port with manual damper
Air Circulation Fan	Radial Fan FHP 0.5HP

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (degree C)	30^{o}C (±5^{o}C)
Humidity (%)	≤67% 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.

Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

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
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)

Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

SAMPLE PREPARATION AND METHOD/PROCEDURE:

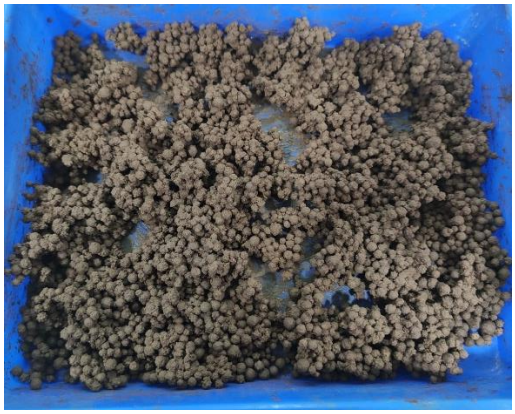
The experiment has been performed on given sample i.e. Bentonite Granules for drying treatment. For this experimental run, given sample is passed through continuous rotary IR heating system at various set parameters. Multiple passes are given to achieve desired output. The observations are made on the basis of moisture reduction and physical changes in product samples.

Method use to increase moisture content- The dry mass and water mass of original sample was calculated followed by calculating total humidified sample mass. Then the amount of water should be added was calculated i.e. total humidified sample mass subtracted with initial sample mass.

(500g sample + 70 ml water) = moisture increase by 9% approx.

Before and after photo of sample-

BEFORE



AFTER

Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

ANALYTICAL RESULTS:

Trial No. 1:

Initial Weight: 1kg

Initial Moisture: 13.8%

IR set temperature: 300°C

Drum speed:100%

Sr. No.	Cycle Time (minutes)	Product Temp. (°C)	Moisture Content. %	Remarks.
1.	33min.	(50-69) °C	3.6%	Partially dried.
2.	66min.	(80-98) °C	0.8%	Dried as desired.

Final weight:815g

Final Moisture:0.8%

Total cycle time: 1hr 6 min.

Trial No. 2:

Initial Weight: 1kg

Initial Moisture: 13.8%

IR set temperature: 300°C

Drum speed:50%

Sr. No.	Cycle Time (minutes)	Product Temp. (°C)	Moisture Content. %	Remarks.
1.	36min.	(60-85) °C	2.3%	Partially dried.
2.	72min.	(95-125) °C	0.9%	Dried as desired.

Final weight:840g

Final Moisture:0.9%

Total cycle time: 1hr 12 min.

Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

Trial No. 3:

Initial Weight: 500g

Initial Moisture: 22.3%

IR set temperature: 350°C

Drum speed:70%

Sr. No.	Cycle Time (minutes)	Product Temp. (°C)	Moisture Content. %	Remarks.
1.	24min.	(87-98) °C	2%	Partially dried.
2.	48min.	(100-139) °C	0.6%	Dried as desired.

Final weight:382g

Final Moisture:0.6%

Total cycle time: 48 min.

Trial No. 4:

Initial Weight: 500g

Initial Moisture: 22.9%

IR set temperature: 350°C

Drum speed:50%

Sr. No.	Cycle Time (minutes)	Product Temp. (°C)	Moisture Content. %	Remarks.
1.	18min.	(87-99) °C	2.3%	partially dried.
2.	36min.	(100-147) °C	0.9%	dried as desired.

Final weight:365g

Final Moisture:0.9%

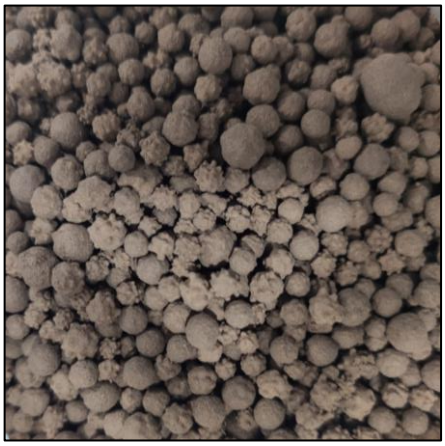
Total cycle time: 36 min.

Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

BEFORE AND AFTER PICTURES OF TREATED SAMPLE:

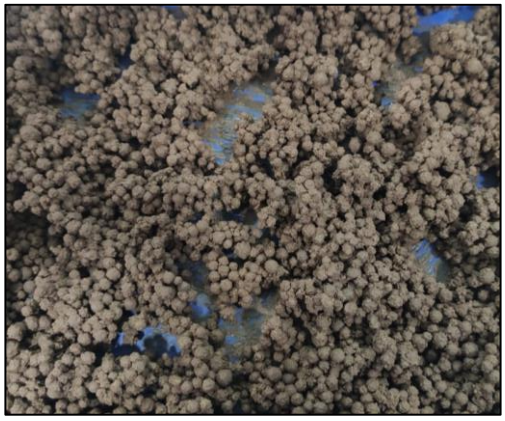
Sample with moisture content below 20%

a) Untreated



b) Treated

Sample with moisture content above 20%



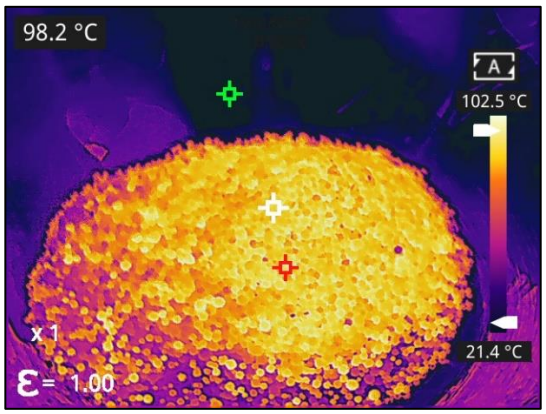
a) Untreated

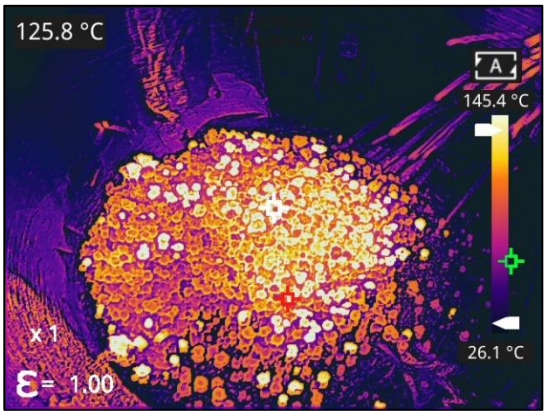
b) Treated

Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

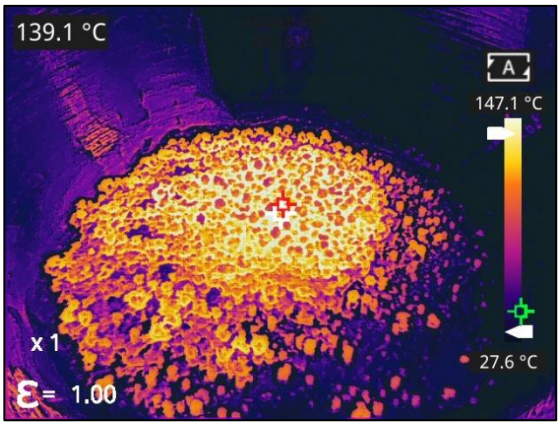
THERMAL IMAGE HEAT TREATMENT:

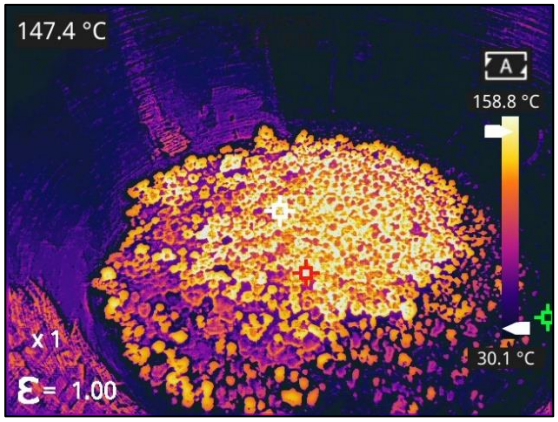
Sample with moisture content below 20%





Sample with moisture content above 20%





MEMBER OF A.M.P.E.R.E (EUROPE)
MEMBER OF AIMCAL (USA)
IN ASSOCIATION WITH EMitech, ITALY

A CRISIL-NSIC RATED
COMPANY ISO-9001-2008

Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

MOISTURE ANALYSIS REPORTS:

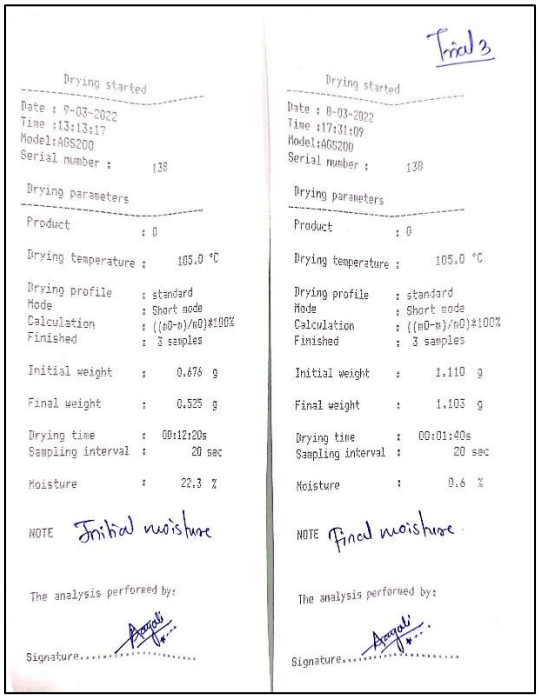
Sample with moisture content below 20%

Drying started
Date : 8-03-2022
Time :11:24:48
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 : 1.152 g
Final weight : 0.993 g
Drying time : 00:07:00s
Sampling interval : 20 sec
Moisture : 13.8 %
NOTE Initial moisture
The analysis performed by:
Signature

Trial 1
Drying started
Date : 8-03-2022
Time :17:52:09
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 : time over
Initial weight : 0.713 g
Final weight : 0.707 g
Drying time : 00:00:19s
Sampling interval : 20 sec
Moisture : 0.8 %
NOTE Final moisture
The analysis performed by:
Signature

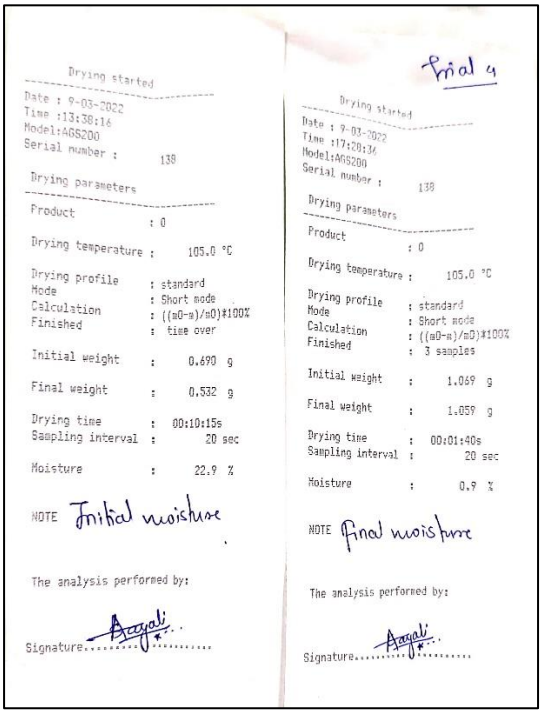
Trial 2
Drying started
Date : 9-03-2022
Time :15:18:19
Model:AGS200
Serial number : 138
Drying parameters
Product : 0
Drying temperature : 105.0 °C
Drying profile : standard
Mode : Short mode
Calculation : ((m0-m)/m0)*100%
Finished : time over
Initial weight : 0.845 g
Final weight : 0.837 g
Drying time : 00:00:34s
Sampling interval : 20 sec
Moisture : 0.9 %
NOTE Final moisture
The analysis performed by:
Signature

Sample with moisture content above 20%



Drying started
Date : 9-03-2022
Time :13:13:17
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 : 0.676 g
Final weight : 0.525 g
Drying time : 00:12:20s
Sampling interval : 20 sec
Moisture : 22.3 %
NOTE Initial moisture
The analysis performed by:
Signature

Trial 3
Drying started
Date : 8-03-2022
Time :17:31:09
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 : 1.110 g
Final weight : 1.103 g
Drying time : 00:01:40s
Sampling interval : 20 sec
Moisture : 0.6 %
NOTE Final moisture
The analysis performed by:
Signature



Drying started
Date : 9-03-2022
Time :13:38:16
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 : time over
Initial weight : 0.690 g
Final weight : 0.532 g
Drying time : 00:10:15s
Sampling interval : 20 sec
Moisture : 22.9 %
NOTE Initial moisture
The analysis performed by:
Signature

Trial 4
Drying started
Date : 9-03-2022
Time :17:20:34
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 : 1.069 g
Final weight : 1.059 g
Drying time : 00:01:40s
Sampling interval : 20 sec
Moisture : 0.9 %
NOTE final moisture
The analysis performed by:
Signature

Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

OBSERVATIONS:

The heating behavior of Bentonite Granules has been investigated under the Rotary IR Heating System. The heating rate is found to be increasing with respect to increasing cycle time. Also, it has been found that the colour of granules has becomes lighter. Complete product is dried as desired.

Ms. Sayali Asole

Tested By