

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

Customer :	Laboratory Experimental Analysis
Process :	Continuous Microwave Heat Treatment for Drying of Charcoal Briquette

TEST REPORT No: 47/KRDC/LAB/17 Mum 18/02/2018

Date Sample reception : 10/02/2018
ID : 47/LAB/18

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : 5 kilograms
Sampling date : 10/02/2018
Product : Charcoal Briquette
Requirement : Dried product must have 3-4% moisture content
Start Date test : 19/02/2018
End Date test : 19/02/2018

LABORATORY EXPERIMENTAL SET UP:**Format: F/R&D/01**

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Lab Microwave Heating System Specifications:


Microwave Power	1.45 kW(CW)
Frequency	2450 MHz \pm 50
Infra-red Power	6 kW
Microwave Exposure Zone (Cavity)	1000 mm length wise
Web width	380mm
Entry Vestibule length	1200mm
Exit Vestibule Length	1200 mm
Exhaust Power	0.5 HP

Environment-laboratory Ambient Conditions:

Temperature (degree C)	30°C (\pm 5°C)
Humidity (%)	\leq 20 % RH
Pressure (kN/m ² 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

EQUIPMENTS USED:

Name of Equipment	Picture of Equipment	Specifications
Compact Thermal Imaging Camera		Model: FLIR E-30 Resolution: 160 x 120 IR Thermal sensitivity of 0.10°C

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Moisture Analyzer



Make: Axis Balance

Description:

**Moisture range: 1%(sample
0.02/0.05g), 0.1% (Sample 0.5/5g),
0.01%(Sample>5g)**

SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on charcoal briquette which were dried in continuous microwave heating system without adding any additive to speed up the drying rate. These briquette on microwave safe tray has placed in such a manner that none of them are touching and get uniform exposure of microwaves and this tray passed through continuous microwave heating system with low conveyor speed.

The observations are made after every 1 pass of 10 minutes on the basis of LOD method by checking weight loss. Also, initial weight before drying and final weight after drying was taken.

ANALYTICAL RESULTS:

Initial sample weight: 595 grams

Intensity: 100%

Initial Moisture Content: 32.44%

Sr. No.	Time (minutes)	Temperature on sample (°C)	Weight noted (grams)	Weight loss (grams)	Remarks, if any
1.	After 10	54.6	562	33	Drying rate started
2.	After 20	67.3	517	78	Drying phase continue
3.	After 30	70.2	469	126	Variant of Drying rate
4.	After 40	72.5	425	170	Required Drying rate

Sample weight after drying: 425 grams

Total weight loss on drying: 170 grams

Final Moisture Content: 3.3 %

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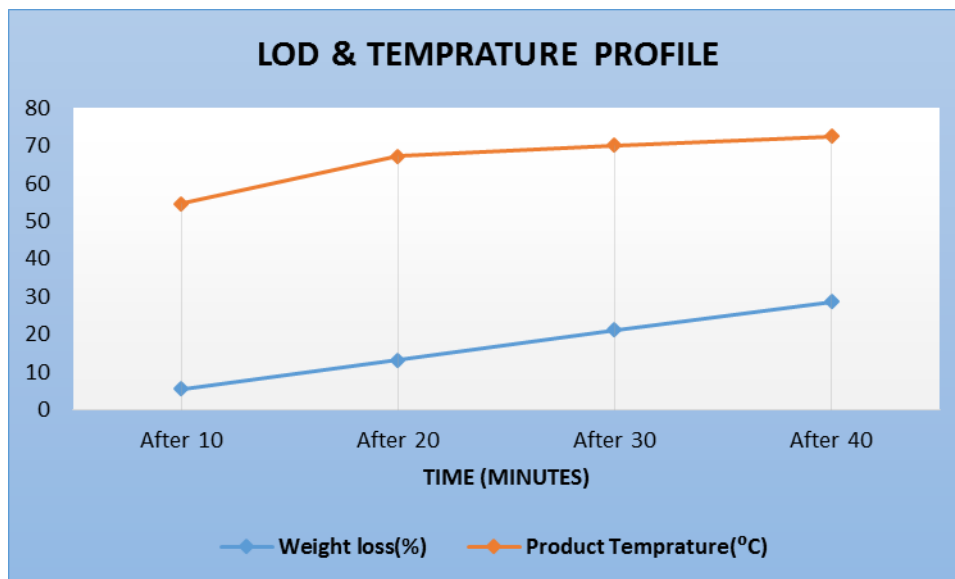
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MOISTURE ANALYSIS REPORTS:

Drying started	
Date	19-02-2018
Time	14:42:52
Model	AGS200
Serial number	138
Drying parameters	
Product	Test
Drying temperature	105.0 °C
Drying profile	standard
Mode	Short mode
Calculation	$((w_0 - w)/w_0) \times 100\%$
Finished	3 samples
Initial weight	8.136 g
Final weight	5.497 g
Drying time	01:15:40s
Sampling interval	20 sec
Moisture	32.44 %
NOTE Initial	
The analysis performed by:	
Signature: <i>K Komal</i>	

Drying started	
Date	19-02-2018
Time	15:01:59
Model	AGS200
Serial number	138
Drying parameters	
Product	Test
Drying temperature	105.0 °C
Drying profile	standard
Mode	Short mode
Calculation	$((w_0 - w)/w_0) \times 100\%$
Finished	3 samples
Initial weight	4.891 g
Final weight	4.731 g
Drying time	00:13:00s
Sampling interval	20 sec
Moisture	3.3 %
NOTE Final	
The analysis performed by:	
Signature: <i>K Komal</i>	

GRAPHICAL REPRESENTATION OF DRYING PARAMETERS:



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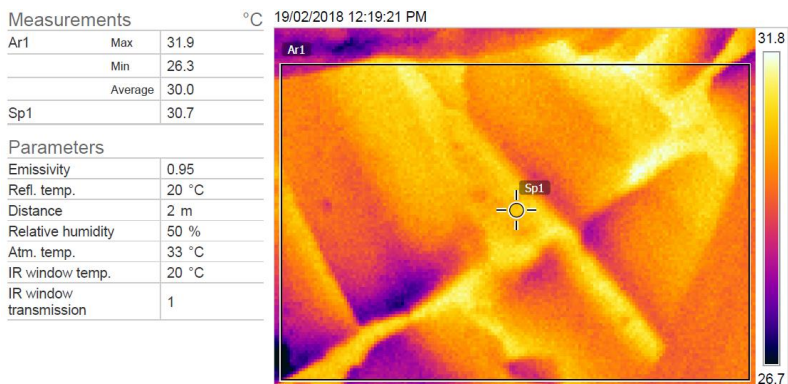
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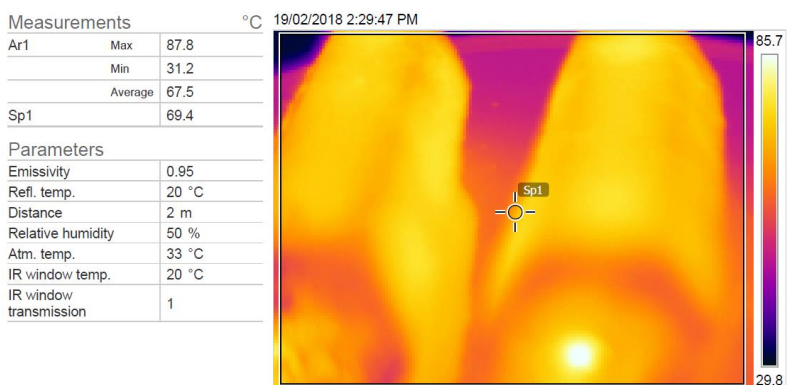
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THERMAL IMAGE BEFORE AND AFTER HEAT TREATMENT:

1. Before Heat Treatment



2. After Heat Treatment:



BEFORE AND AFTER PICTURES OF TREATED SPECIMEN SAMPLE:



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OBSERVATIONS:

The Drying behavior of charcoal briquettes has been investigated under the microwave irradiation mode dryer. The drying rate is found to be increasing with respect to increasing drying time. It has been found that the moisture content on the dry basis (%) decreases with respect to increase drying time. As per physical investigation, it has been observed that there is no crackle deformation.



Miss Komal Bhoite
Tested By



Dr. Uttam K. Goswami
Approved By

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