



KRDC

Kerone Research &
Development Center



KERONE
Kerone Engineering Solutions Limited



48⁺ Year
Of experience

**Batch Microwave Oven
Heat-treatment on
detergent particles to
increase the porosity**



In Association with SVCH-Technologii, Moscow (Russia)

ISO 9001:2015 | ISO 14001:2015 | EMS 14001 | OHSAS 18001:2007

Customer:	
Process:	Batch Microwave Oven Heat-treatment on detergent particle to enhance porosity (To reduce Bulk density).

Test Report No: 251/KRDC/LAB/17 Mum 12/03/2024

Date Sample reception : 12/3/2024
ID : 182/LAB/24

Sample Description:

Sampling : As Requested
Sample Condition : Acceptable
Sampling Date : 12/03/2024
Product : Detergent powder
End Date Test : 13/03/2024

Laboratory Experimental System –



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Address

Kerone Research & Development Center (KRDC) Plot No K2, Industrial Gala F4A, D-Wing, MGN Properties, Opposite Godrej Co., Addl MIDC Anand Nagar, Ambarnath (E)- 421506 (India) +91-2512620543/44



Specifications –

Microwave Power	3.5 KW (CW)
Frequency	2450 MHz \pm 50
Convective Power	3.5 KW (airflow 350 l/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)	29.4°C (\pm 5°C)
Humidity (%)	\leq 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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Laboratory's Environmental Conditions –

Name of Equipment	Picture of Equipment	Specification
Compact Thermal Imaging Camera		Model: FLIR E-30 Resolutions: 160x120IR Thermal Sensitivity of 0.10°C
Moisture Analyzer		Make: Axis Balance Description: Moisture Range: 1% (sample 0.5/5g), 0.01% (Sample>5g)
Analytical Balances LINB-A10		Capacity: 100g Minimum Weighing: 0.0004g Resolution: 0.0001g Pan size: \varnothing 80 mm
Microscope		Parfocal and Centered Strain free optics Optics with multi- layer coating Choice of halogen and LED illumination Easy access for lamp replacement

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Procedure of the Experiment –

- The experiment was performed on Detergent Powder (HUL) to speed up the heating rate.
- For this experimental run, the given sample was taken and passed in the Batch Microwave heating system with suitable parameters.
- After the heating treatment, the sample was analyzed.

Analytical Results:

Initial weight: 50gm

Initial Moisture: 2.8%

Trial no.	Time (min)	Temperature °C	Weight (g)		Moisture Content (%)		Observations
			Initial	Final	Initial	Final	
1	15	140	50	49	2.8	1.6	Gradual decrease in moisture, no change in composition.
2	15	140	49	48	1.6	1.6	No change in moisture content.
3	30	140	48	47	1.6	0.9	1. Further decrease in moisture, no change in composition, no colour change observed. 2. Bulk density = 1.04 g/ml

Images During Trials:

Initial Image



Final Image



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Moisture Analysis Report:

Trial01

Drying started	
Date :12-03-2024	Date :12-03-2024
Time :14:41:38	Time :16:19:25
Model:AGS200	Model:AGS200
Serial number : 138	Serial number : 138
Drying parameters	
Product : 0	Product : 0
Drying temperature : 140.0 °C	Drying temperature : 140.0 °C
Drying profile : standard	Drying profile : standard
Mode : Short mode	Mode : Short mode
Calculation : $((m0-m)/m0)*100\%$	Calculation : $((m0-m)/m0)*100\%$
Finished : 3 samples	Finished : 3 samples
Initial weight : 1.052 g	Initial weight : 1.055 g
Final weight : 1.052 g	Final weight : 1.038 g
Drying time : 00:02:20s	Drying time : 00:02:00s
Sampling interval : 20 sec	Sampling interval : 20 sec
Moisture : 1.6 %	Moisture : 1.6 %
NOTE Initial	NOTE Final
The analysis performed by:	
Signature: <i>Paray</i>	Signature: <i>Paray</i>

Trial 02

Drying started	
Date :12-03-2024	Date :12-03-2024
Time :15:51:52	Time :17:33:17
Model:AGS200	Model:AGS200
Serial number : 138	Serial number : 138
Drying parameters	
Product : 0	Product : 0
Drying temperature : 140.0 °C	Drying temperature : 140.0 °C
Drying profile : standard	Drying profile : standard
Mode : Short mode	Mode : Short mode
Calculation : $((m0-m)/m0)*100\%$	Calculation : $((m0-m)/m0)*100\%$
Finished : 3 samples	Finished : 3 samples
Initial weight : 1.078 g	Initial weight : 1.011 g
Final weight : 1.000 g	Final weight : 1.002 g
Drying time : 00:03:20s	Drying time : 00:02:20s
Sampling interval : 20 sec	Sampling interval : 20 sec
Moisture : 1.6 %	Moisture : 0.9 %
NOTE Initial	NOTE Final
The analysis performed by:	
Signature: <i>Paray</i>	Signature: <i>Paray</i>

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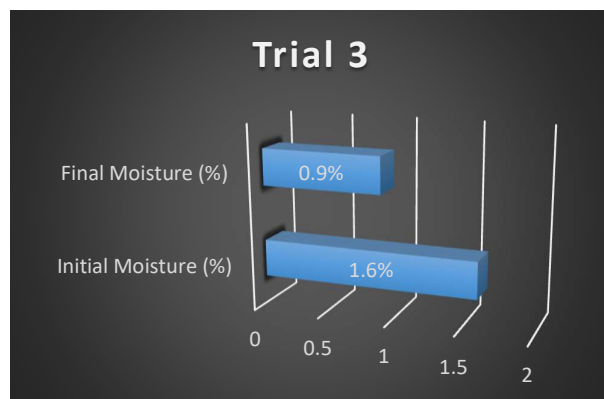
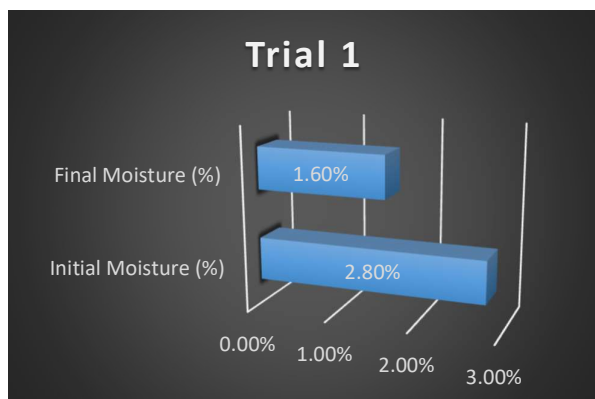
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LOD of Moisture in %:



- In trial 2 there was no change in Moisture content.

LOD of Weight in (gm):



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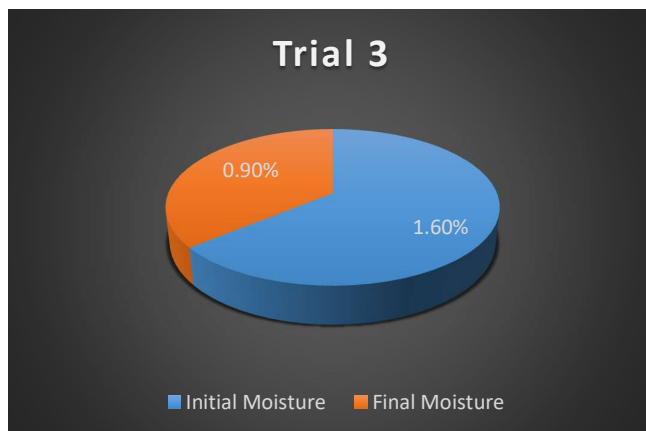
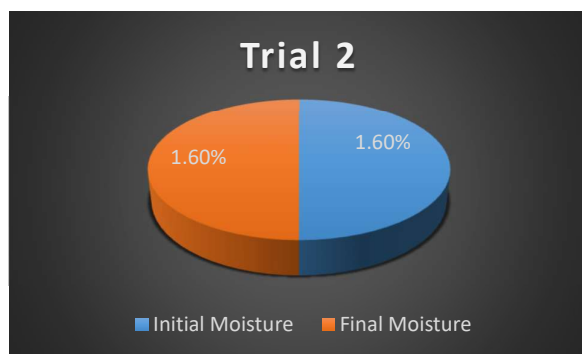
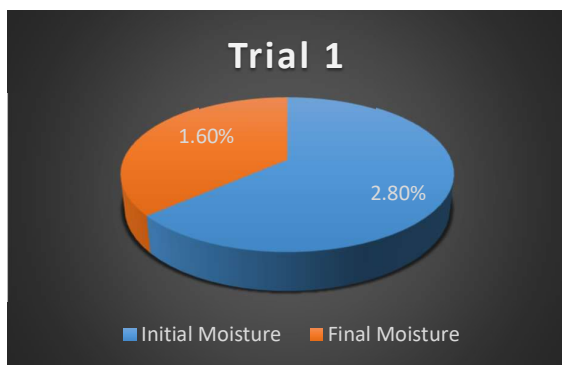
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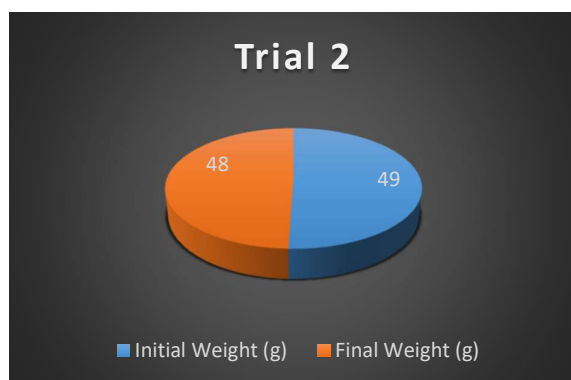
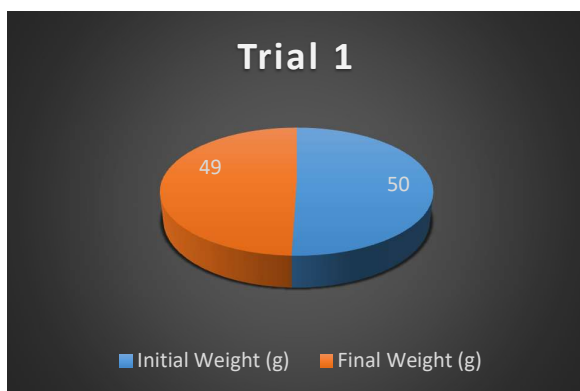
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Pie Chart of Moisture %



Initial weight and Final weight

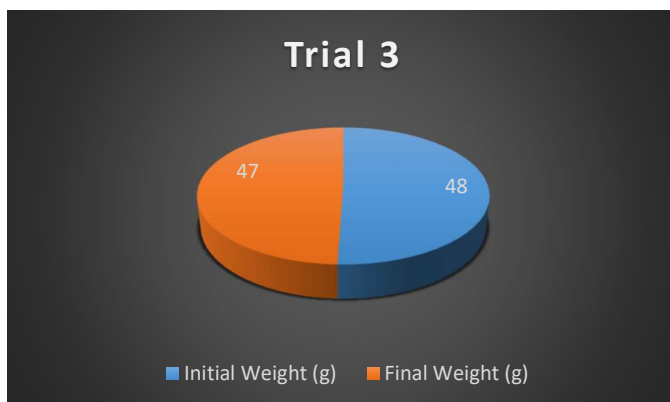


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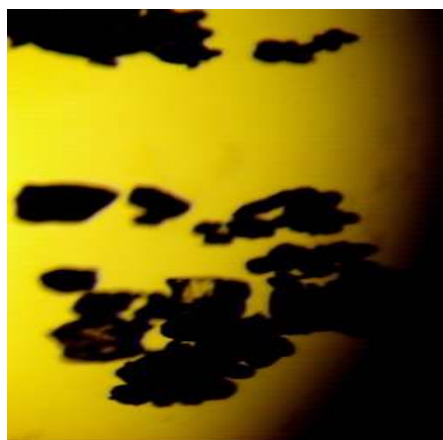
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Microscopic Images:



Initial



Final

Observations:

The heating behavior of Detergent powder (HUL) was investigated under the Batch 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 product particle porosity increased (Bulk density reduced) as expected.

Mr. Pranay Yerunkar
(Tested by)

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