



**KRDC**  
Kerone Research &  
Development Center



**48<sup>+</sup> Year**  
*Of experience*

**BATCH MICROWAVE HEAT  
TREATMENT TO INCREASE  
THE POROSITY OF THE  
DETERGENT POWDER**



In Association with SVCH-Technologii, Moscow (Russia)  
ISO 9001:2015 | ISO 14001:2015 | EMS 14001 | OHSAS 18001:2007

<b>Customer:</b>	
<b>Process:</b>	<b>BATCH MICROWAVE HEAT TREATMENT TO INCREASE THE POROSITY OF THE DETERGENT POWDER.</b>

**Test Report No: 251/KRDC/LAB/17 Mum 13/03/2024**

Date Sample reception : 13/3/2024  
ID : 182/LAB/24

**Sample Description:**

Sampling : As Requested  
Sample Condition : Acceptable  
Sampling Date : 12/03/2024  
Product : Detergent powder  
End Date Test : 14/03/2024

**Laboratory Experimental System –**



**Format: F/R&D/01**

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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 –

<b>Microwave Power</b>	3.5 KW (CW)
<b>Frequency</b>	2450 MHz ± 50
<b>Convective Power</b>	3.5 KW (airflow 350 l/min at 20°C)
<b>Microwave Exposure Zone (Cavity)</b>	1 Cubic meter
<b>Mode Stirrer</b>	One
<b>Thermal Monitoring System</b>	Single Channel Fiber Optic: Range - 40 to 250°C
<b>Exhaust Power</b>	1 HP
<b>Tray size (width*height*depth)</b>	450*950*50 mm

### Laboratory's Environmental Conditions –

<b>Temperature (degree C)</b>	29.4°C (±5°C)
<b>Humidity (%)</b>	≤50% RH
<b>Pressure (kN/m<sup>2</sup> or kPa)</b>	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 gives 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: 500gm**

**Initial Moisture: 2.8%**

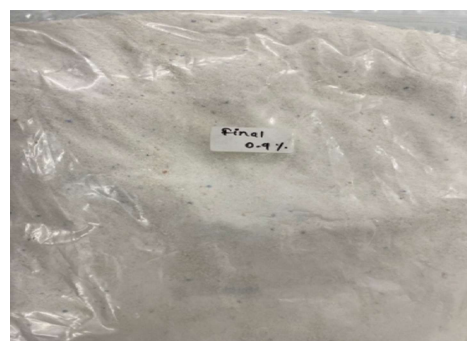
Trial no.	Time (min)	Temperature °C	Weight (g)		Moisture Content (%)		Bulk Density (g/ml)	Observations
			Initial	Final	Initial	Final		
1	30	140	500	496	2.8	1.4	1.07	Gradual decrease in moisture, no change in composition.
2	45	140	495	488	1.4	1.3	1.04	Minimal change in moisture content and greater decrease in weight.
3	30	150	486	485	1.3	0.9	1.01	Further decrease in moisture, no change in composition, no colour change observed.

### Images During Trials:

#### Initial Image



#### Final Image



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**Moisture Analysis Report:**

<p>?#      Drying started</p> <p>-----</p> <p>Date :12-03-2024 Time :14:41:38 Model:AGS200 Serial number :      138</p> <p>Drying parameters</p> <p>-----</p> <p>Product                    : 0</p> <p>Drying temperature :      140.0 °C</p> <p>Drying profile        : standard Mode                    : Short mode Calculation           : ((m0-m)/m0)*100% Finished                : 3 samples</p> <p>Initial weight        : 1.082 g <i>1.082 g</i></p> <p>Final weight         : 1.052 g</p> <p>Drying time <i>18.8</i> : 00:02:30s Sampling interval :      20 sec</p> <p>Moisture <i>10.1</i> : 0.9 %</p> <p>NOTE      <i>Initial</i></p> <p>The analysis performed by:</p> <p>Signature: <i>Panay</i></p>	<p>?L      Drying started</p> <p>-----</p> <p>Date :15-03-2024 Time :16:57:10 Model:AGS200 Serial number :      138</p> <p>Drying parameters</p> <p>-----</p> <p>Product                    : 0</p> <p>Drying temperature :      140.0 °C</p> <p>Drying profile        : standard Mode                    : Short mode Calculation           : ((m0-m)/m0)*100% Finished                : 3 samples</p> <p>Initial weight        : 1.012 g</p> <p>Final weight         : 1.003 g</p> <p>Drying time            : 00:03:00s Sampling interval :      20 sec</p> <p>Moisture                :      0.9 %</p> <p>NOTE      <i>final</i></p> <p>The analysis performed by:</p> <p>Signature: <i>Panay</i></p>
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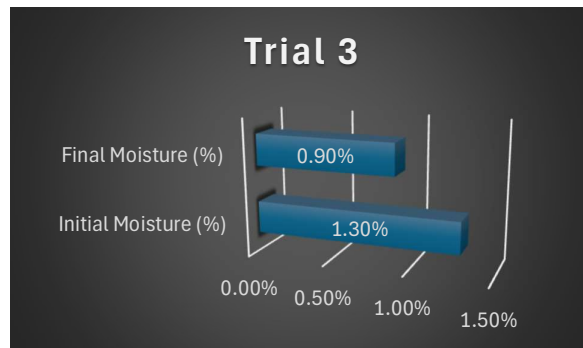
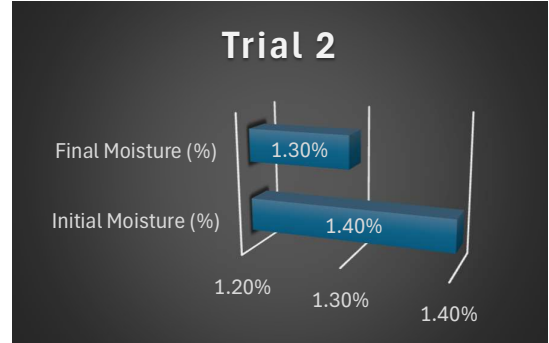
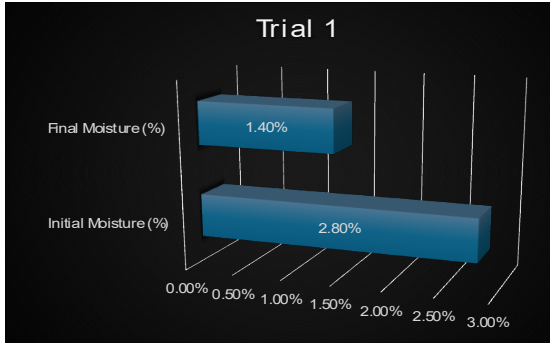
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**LOD of Moisture in %:**



**LOD of Weight in (gm):**



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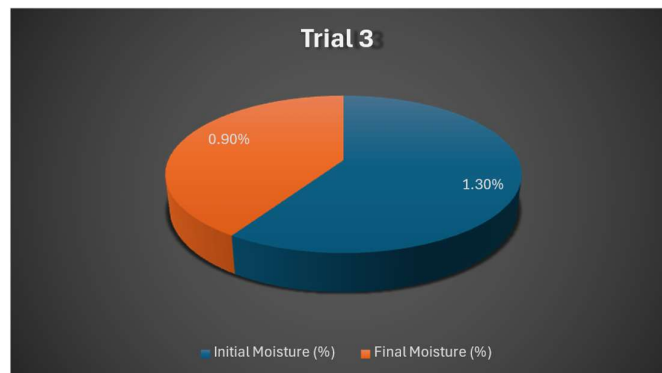
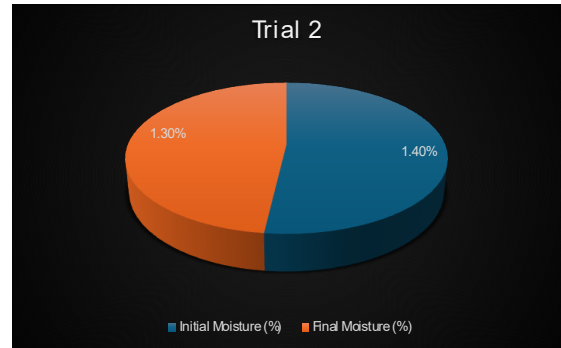
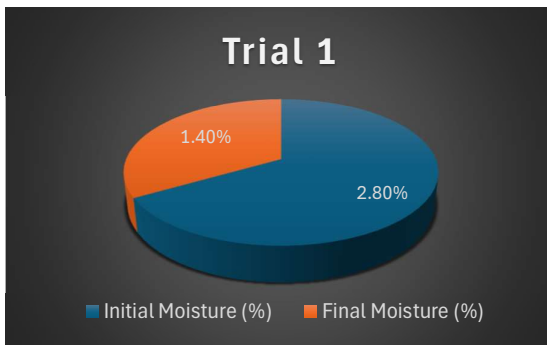
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### **Pie Chart of Moisture %**



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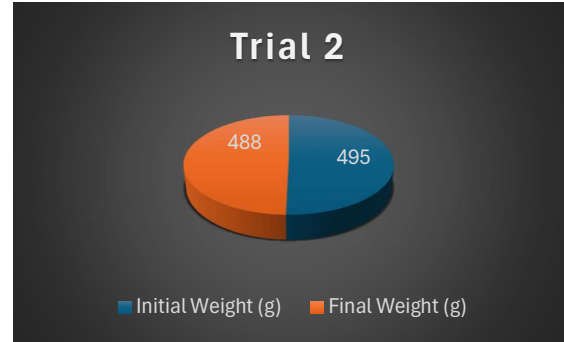
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**Pie Chart of Weight (gm)**

**Initial weight and Final weight**



**Microscopic Images:**



**Initial (64.9pxl)**



**Final (72.2pxl)**

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### **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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