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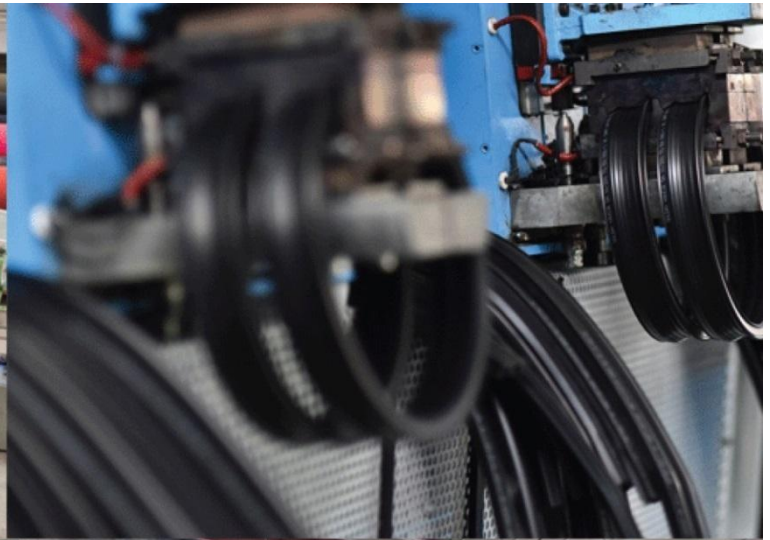
A.M.P.E.R.E(EUROPE)

In Association With



ELECTRO MAGNETIC innovative technologies

Kerone Research & Development Centre (KRDC),
B/47, Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
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**Batch Convection Heat Treatment
on Fertilizer**

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



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Customer :	M/s. WARKEM BIOTECH PVT. LTD.
Process :	Batch Convection Heat Treatment on Fertilizer

TEST REPORT No: 83/KRDC/LAB/66 Mum 17/06/2022

Date Sample reception : 17/06/2022

ID : 83/LAB/17

SAMPLE DESCRIPTION:

Sampling : As Requested

Sample Condition : Acceptable

Samples opening date : 17/04/2022

Product : Fertilizer

Start Date test : 17/06/2022

End Date test : 17/06/2022

LABORATORY EXPERIMENTAL SETUP:



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LAB BATCH CONVECTION HEATING SYSTEM SPECIFICATIONS:

Heating Zone (width*height*depth)	510*480*410 mm
No. of Heaters	6
Total Heater Power	6 kW
Motor	0.5 HP
No. of trays	6
Tray size (width*height*depth)	560 x 435 x25
Centrifugal Exhaust Blower	1440 rpm

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:




Temperature (°C)	26°C (±5°C)
Humidity (%)	≤74% 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



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EQUIPMENTS USED:

Name of Equipment	Picture of Equipment	Specifications
Compact Thermal Imaging Camera		Model: FLIR E-30 Resolution: 160x 120 IR 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: $\pm^{\circ}\text{C}$ (1.8°F) Temperature resolution: 0.1°C (0.2°F) Humidity range: 10%~99% RH Humidity accuracy: $\pm 5\%$ RH Humidity resolution: 1% RH

SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on Fertilizer to speed up the drying rate. For this experimental run, given sample has been placed on a perforated tray and then placed in Horizontal Batch Convection Oven at certain decided temperature and time cycle. Observations are made on the final moisture content of sample weight and appearance of product.

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ANALYTICAL RESULTS:

Trial 1: PROM (layer)

Initial Wt. of Sample - 220gms

Initial moisture – 17.1%

Setting Temperature: 90°C

Sr.No	Cycle Time	ProductTemp. (°C)	Remarks, if any
1	After 15 min.	(60-65) °C	breakable
2	After 30 min.	(73-75) °C	Hardened, Dried as desired

Total Cycle time - 30 min

Final Weight – 185gms

Final moisture - 4.8%

Trial 2: PROM (spread)

Initial Wt. of Sample - 220gms

Initial moisture – 17.1%

Setting Temperature: 90°C

Sr.No	Cycle Time	ProductTemp. (°C)	Remarks, if any
1	After 15 min.	(80-85) °C	breakable
2	After 30 min.	(90-94) °C	Hardened, Dried as desired

Total Cycle time - 30 min

Final Weight – 175gms

Final moisture – 4.3%

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Trial 3: SOS (layer)

Initial Wt. of Sample - 240gms

Initial moisture – 25.7%

Setting Temperature: 90°C

Sr.No	Cycle Time	ProductTemp. (°C)	Remarks, if any
1	After 15 min.	(68-70)°C	breakable
2	After 30 min.	(77-80) °C	Hardened, Dried as desired

Total Cycle time - 30 min

Final Weight – 185gms

Final moisture - 6.2%

Trial 4: SOS (spread)

Initial Wt. of Sample - 240gms

Initial moisture – 25.7%

Setting Temperature: 90°C

Sr.No	Cycle Time	ProductTemp. (°C)	Remarks, if any
1	After 15 min.	(90-93) °C	breakable
2	After 30 min.	(101-104) °C	Hardened, Dried as desired

Total Cycle time - 30 min

Final Weight – 179gms

Final moisture – 3.0%



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Trial 5: NIM (layer)

Initial Wt. of Sample - 270gms

Initial moisture – 23.5%

Setting Temperature: 90°C

Sr.No	Cycle Time	ProductTemp. (°C)	Remarks, if any
1	After 15 min.	(63-65) °C	breakable
2	After 30 min.	(70-73)°C	Hardened, Dried as desired

Total Cycle time - 30 min

Final Weight – 233gms

Final moisture - 6.5%

Trial 6: NIM (spread)

Initial Wt. of Sample - 270gms

Initial moisture – 23.5%

Setting Temperature: 90°C

Sr.No	Cycle Time	ProductTemp. (°C)	Remarks, if any
1	After 15 min.	(70-75) °C	breakable
2	After 30 min.	(90-98)°C	Hardened, Dried as desired

Total Cycle time - 30 min




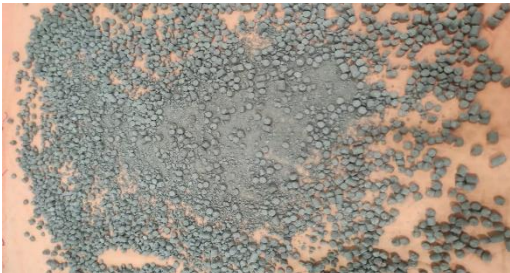


Final Weight – 223gms

Final moisture – 2.8%



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BEFORE AND AFTER PICTURES OF TREATED SPECIMEN SAMPLE:

<u>Trial</u>	Untreated Sample	Treated Sample
<u>1</u>		
<u>2</u>		
<u>3</u>		



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MOISTURE ANALYSIS REPORT: (Initial Moisture - PROM, SOS, NIM)

<p>Date :17-06-2022 Time :14:11:18 Model:AGS200 Serial number : 138</p> <p>Drying parameters</p> <p>Product : 0</p> <p>Drying temperature : 105.0 °C</p> <p>Drying profile : standard Mode : Short mode Calculation : $((m0-m)/m0)*100\%$ Finished : 3 samples</p> <p>Initial weight : 0.741 g Final weight : 0.614 g</p> <p>Drying time : 00:09:20s Sampling interval : 20 sec</p> <p>Moisture : 17.1 %</p> <p>NOTE Initial moisture (PROM)</p> <p>The analysis performed by:</p> <p>Signature: <i>Aravali</i></p>	<p>Date :17-06-2022 Time :14:40:22 Model:AGS200 Serial number : 138</p> <p>Drying parameters</p> <p>Product : 0</p> <p>Drying temperature : 105.0 °C</p> <p>Drying profile : standard Mode : Short mode Calculation : $((m0-m)/m0)*100\%$ Finished : 3 samples</p> <p>Initial weight : 0.826 g Final weight : 0.614 g</p> <p>Drying time : 00:14:20s Sampling interval : 20 sec</p> <p>Moisture : 25.7 %</p> <p>NOTE Initial moisture (SOS)</p> <p>The analysis performed by:</p> <p>Signature: <i>Aravali</i></p>	<p>Date :17-06-2022 Time :15:00:22 Model:AGS200 Serial number : 138</p> <p>Drying parameters</p> <p>Product : 0</p> <p>Drying temperature : 105.0 °C</p> <p>Drying profile : standard Mode : Short mode Calculation : $((m0-m)/m0)*100\%$ Finished : 3 samples</p> <p>Initial weight : 0.729 g Final weight : 0.558 g</p> <p>Drying time : 00:10:20s Sampling interval : 20 sec</p> <p>Moisture : 23.5 %</p> <p>NOTE Initial moisture (NIM)</p> <p>The analysis performed by:</p> <p>Signature: <i>Aravali</i></p>
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MOISTURE ANALYSIS REPORT: (Final Moisture - PROM)

Drying started	Drying started
Date :17-06-2022	Date :17-06-2022
Time :15:44:50	Time :15:23:04
Model:AGS200	Model:AGS200
Serial number : 138	Serial number : 138
Drying parameters	Drying parameters
Product : 0	Product : 0
Drying temperature : 105.0 °C	Drying temperature : 105.0 °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 : 0.796 g	Initial weight : 0.739 g
Final weight : 0.758 g	Final weight : 0.707 g
Drying time : 00:06:00s	Drying time : 00:04:00s
Sampling interval : 20 sec	Sampling interval : 20 sec
Moisture : 4.8 %	Moisture : 4.3 %
NOTE Final moisture (layer) PROM	NOTE Final moisture (spread) PROM
The analysis performed by:	The analysis performed by:
Signature..... <i>Aravali</i>	Signature..... <i>Aravali</i>

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MOISTURE ANALYSIS REPORT: (Final Moisture - SOS)

Drying started		Drying started	
Date :17-06-2022		Date :17-06-2022	
Time :15:30:54		Time :15:37:32	
Model:AGS200		Model:AGS200	
Serial number : 138		Serial number : 138	
Drying parameters		Drying parameters	
Product : 0		Product : 0	
Drying temperature : 105.0 °C		Drying temperature : 105.0 °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 : 0.769 g		Initial weight : 0.763 g	
Final weight : 0.721 g		Final weight : 0.740 g	
Drying time : 00:05:20s		Drying time : 00:03:40s	
Sampling interval : 20 sec		Sampling interval : 20 sec	
Moisture : 6.2 %		Moisture : 3.0 %	
NOTE Final moisture (clayer) SOS		NOTE Final moisture (spread) SOS	
The analysis performed by:		The analysis performed by:	
Signature..... <i>Agarwal</i>		Signature..... <i>Agarwal</i>	




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MOISTURE ANALYSIS REPORT: (Final Moisture - NIM)

Drying started	
Date : 17-06-2022	
Time : 16:56:56	
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 :	0.723 g
Final weight :	0.703 g
Drying time :	00:03:20s
Sampling interval :	20 sec
Moisture :	2.8 %
NOTE	Final moisture (spread) NIM
The analysis performed by:	
Signature.....	

Drying started	
Date : 17-06-2022	
Time : 16:52:41	
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 :	0.615 g
Final weight :	0.575 g
Drying time :	00:03:20s
Sampling interval :	20 sec
Moisture :	6.5 %
NOTE	Final moisture (clayer) NIM
The analysis performed by:	
Signature.....	

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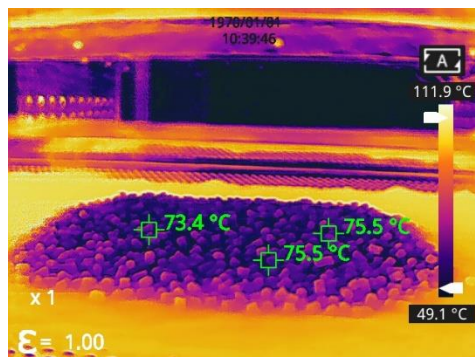
THERMAL ANALYSIS REPORTS:

Measurements

Sp1	73.4°C
Sp2	75.5°C
Sp3	75.5°C

Parameters

Emissivity	1.00
temp.	111.9°C

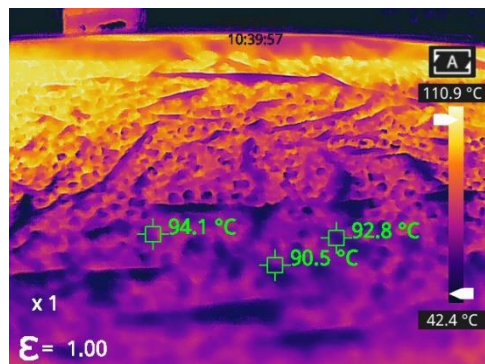


Measurements

Sp1	94.1°C
Sp2	90.5°C
Sp3	92.8°C

Parameters

Emissivity	1.00
temp.	110.9°C



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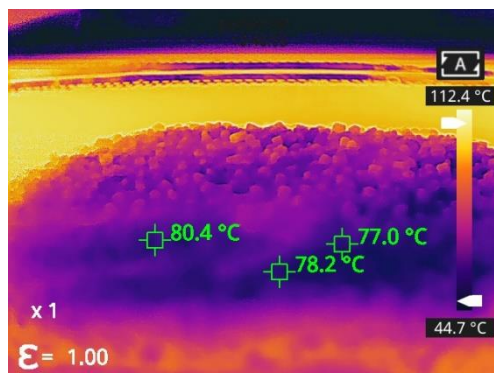
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Measurements

Sp1	80.4°C
Sp2	77.0°C
Sp3	78.2°C

Parameters

Emissivity	1.00
temp.	112.4°C

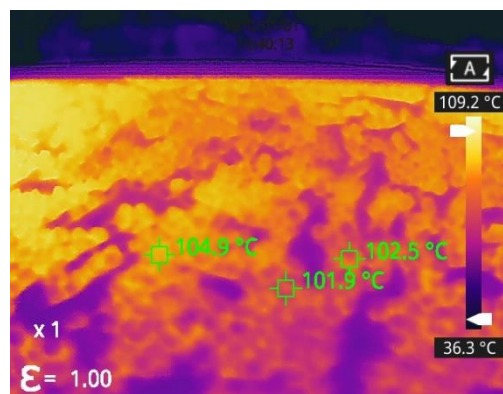


Measurements

Sp1	104.9°C
Sp2	102.5°C
Sp3	101.9°C

Parameters

Emissivity	1.00
Refl. temp.	109.2°C





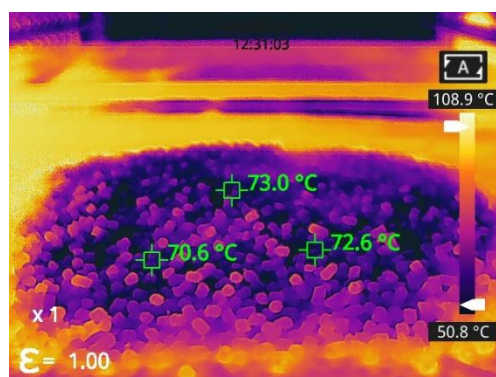
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Measurements

Sp1	73.0°C
Sp2	70.6°C
Sp3	72.6°C

Parameters

Emissivity	1.00
Refl. temp.	108.9°C

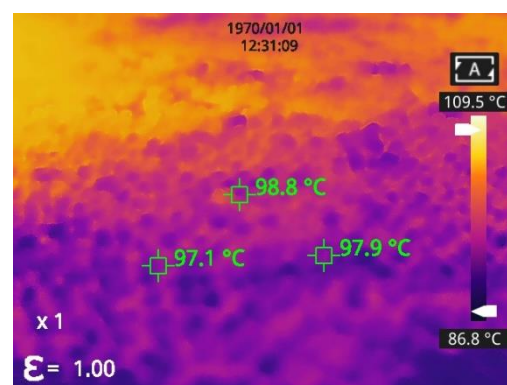


Measurements

Sp1	98.8°C
Sp2	97.1°C
Sp3	97.9°C

Parameters

Emissivity	1.00
Refl. temp.	109.5°C





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OBSERVATIONS:

The Drying behavior of Fertilizer has been investigated under the convection heating system. 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 When product is allowed to dry steadily at temperature (around 90°C), the product is hardened and dried without burning.

Ms. Sayali Asole
Tested By