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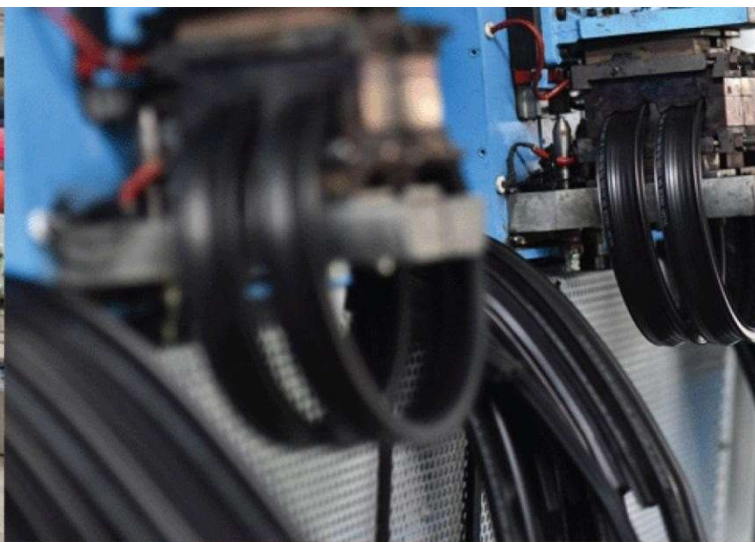


A.M.P.E.R.E(EUROPE)

In Association With



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



**Batch Horizontal Convection Heat
Treatment for Drying of Asafoetida.**

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



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Customer :	M/s. Rakesh Group.
Process :	Batch Horizontal Convection Heat Treatment For Drying of Asafoetida.

TEST REPORT No: 53/KRDC/LAB/66 Mum 07/02/2022

Date Sample reception : 04/02/2022

ID : 53/LAB/07

SAMPLE DESCRIPTION:

Sampling : As Requested
 Sample Condition : Acceptable
 Quantity : 1000 gms
 Samples opening date : 04/02/2022
 Product : Asafoetida
 Start Date test : 04/02/2022
 End Date test : 05/02/2022

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: ±°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

SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on Asafoetida to speed up its drying rate of the product. For this experimental run, the product was molded in different form to check the heating rate of the sample and then kept on cleaned SS tray. Later, it was placed in a Batch Horizontal Convection Oven with suitable set time and temperature profile. The initial weight before drying, initial moisture content, final weight & moisture content is noted.

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ANALYTICAL RESULTS:**Trial 1**

Initial Wt. of product - 500 gms

Setting Temperature: 57°C

products	No of cycles	Cycle Time (min.)	Product Temp. (°C)	Moisture (%)	Remarks, if any
initial	lump	0 min	21°C	16.0%	Initial sample taken
Product A	Small section	After 80 min	44°C	14.0%	Drying starts
	Small section	After 160 min	55°C	12.8%	Drying continues
	Small section	After 240 min	56°C	6.1%	Dried
Product B	flattened	After 80 min	43°C	10.6%	Drying starts
	flattened	After 160 min	50°C	9.1%	Drying continues
	flattened	After 240 min	55°C	4.9%	Dried
Product C	Small balls	After 80 min	44°C	10.3%	Drying starts
	Small balls	After 160 min	49°C	8.8%	Drying continues
	Small balls	After 240 min	54°C	5.7%	Dried
Product D	spheroid	After 80 min	45°C	15.5%	Drying starts
	spheroid	After 160 min	45°C	14.0%	Drying continues
	spheroid	After 240 min	55°C	10.2%	Dried

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Total Cycle time- 4 hours.**Final Wt. of product – 373gms.****Initial moisture of product – 16.0 %****Final moisture of product – A-6.1%, B-4.9%, C-5.7%, D-10.2%****Trial 2****Initial Wt. of product - 400 gms****Setting Temperature: 57°C**

No of cycles	Product forms	Cycle Time (min.)	Set Temp. (°C)	Product Temp. (°C)	Moisture (%)	Remarks, if any
initial	Small section	0 min	57°C	18 °C	16.3%	Molded product
C1	Small section	After 40 min	57°C	49°C	10.2%	Drying starts
C2	Small section	After 120 min	57°C	52°C	7.9%	Drying continues
C4	Flattened (2mm)	After 180 min	57°C	54°C	9.8%	Drying continues
C5	Flattened (2mm)	After 240 min	57°C	57°C	9.2%	Drying continues
C6	Flattened (2mm)	After 300 min	57°C	57°C	6.3%	Dried

Total Cycle time- 5 hours.**Final Wt. of product - 279gms.****Initial moisture of product – 16.3 %****Final moisture of product – 6.3%****Format: F/R&D/01**

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The trial was also performed in Batch microwave heating system for observing the difference of drying in this particular product.

AFTER PICTURES OF TREATED SPECIMEN SAMPLE:

Trial 1

Untreated Sample



Treated Sample



Trial 2

Untreated Sample



Treated Sample





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Moisture Analysis report:

Trail 1

Drying started	
Date : 5-02-2022	
Time : 17:44:41	
Model: AGS200	
Serial number : 138	
Drying parameters	
Product :	
Drying temperature : 105.0 °C	
Drying profile : standard	
Mode : Short mode	
Calculation : $((m0-m)/m0)*100\%$	
Finished : 3 samples	
Initial weight : 1.193 g	
Final weight : 1.120 g	
Drying time : 00:11:20s	
Sampling interval : 20 sec	
Moisture : 6.1 %	
NOTE Final moisture clump	
The analysis performed by:	
Signature: <i>Aswathi</i>	

Drying started	
Date : 7-02-2022	
Time : 13:17:59	
Model: AGS200	
Serial number : 138	
Drying parameters	
Product :	
Drying temperature : 105.0 °C	
Drying profile : standard	
Mode : Short mode	
Calculation : $((m0-m)/m0)*100\%$	
Finished : 3 samples	
Initial weight : 1.427 g	
Final weight : 1.345 g	
Drying time : 00:13:20s	
Sampling interval : 20 sec	
Moisture : 5.7 %	
NOTE final moisture flattened	
The analysis performed by:	
Signature: <i>Aswathi</i>	

Drying started	
Date : 7-02-2022	
Time : 13:31:19	
Model: AGS200	
Serial number : 138	
Drying parameters	
Product :	
Drying temperature : 105.0 °C	
Drying profile : standard	
Mode : Short mode	
Calculation : $((m0-m)/m0)*100\%$	
Finished : 3 samples	
Initial weight : 1.266 g	
Final weight : 1.204 g	
Drying time : 00:12:20s	
Sampling interval : 20 sec	
Moisture : 4.9 %	
NOTE final moisture small balls	
The analysis performed by:	
Signature: <i>Aswathi</i>	

Drying started	
Date : 7-02-2022	
Time : 13:46:23	
Model: AGS200	
Serial number : 138	
Drying parameters	
Product :	
Drying temperature : 105.0 °C	
Drying profile : standard	
Mode : Short mode	
Calculation : $((m0-m)/m0)*100\%$	
Finished : 3 samples	
Initial weight : 0.705 g	
Final weight : 0.633 g	
Drying time : 00:13:40s	
Sampling interval : 20 sec	
Moisture : 10.2 %	
NOTE Final moisture spheroidal	
The analysis performed by:	
Signature: <i>Aswathi</i>	

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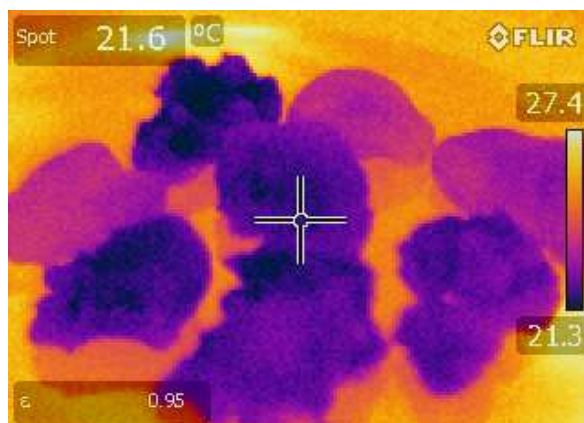
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Trail 2

Drying started		? Drying started	
Date :	4-02-2022	Date :	5-02-2022
Time :	15:17:40	Time :	11:22:09
Model:	AGS200	Model:	AGS200
Serial number :	138	Serial number :	138
Drying parameters		Drying parameters	
Product :		Product :	
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 :	0.786 g	Initial weight :	1.382 g
Final weight :	0.658 g	Final weight :	1.295 g
Drying time :	00:17:40s	Drying time :	00:10:40s
Sampling interval :	20 sec	Sampling interval :	20 sec
Moisture :	16.3 %	Moisture :	6.3 %
NOTE	Initial moisture	NOTE	Final moisture
The analysis performed by:		The analysis performed by:	
Signature.....	<i>Amali</i>	Signature.....	<i>Amali</i>

THERMAL ANALYSIS REPORTS:

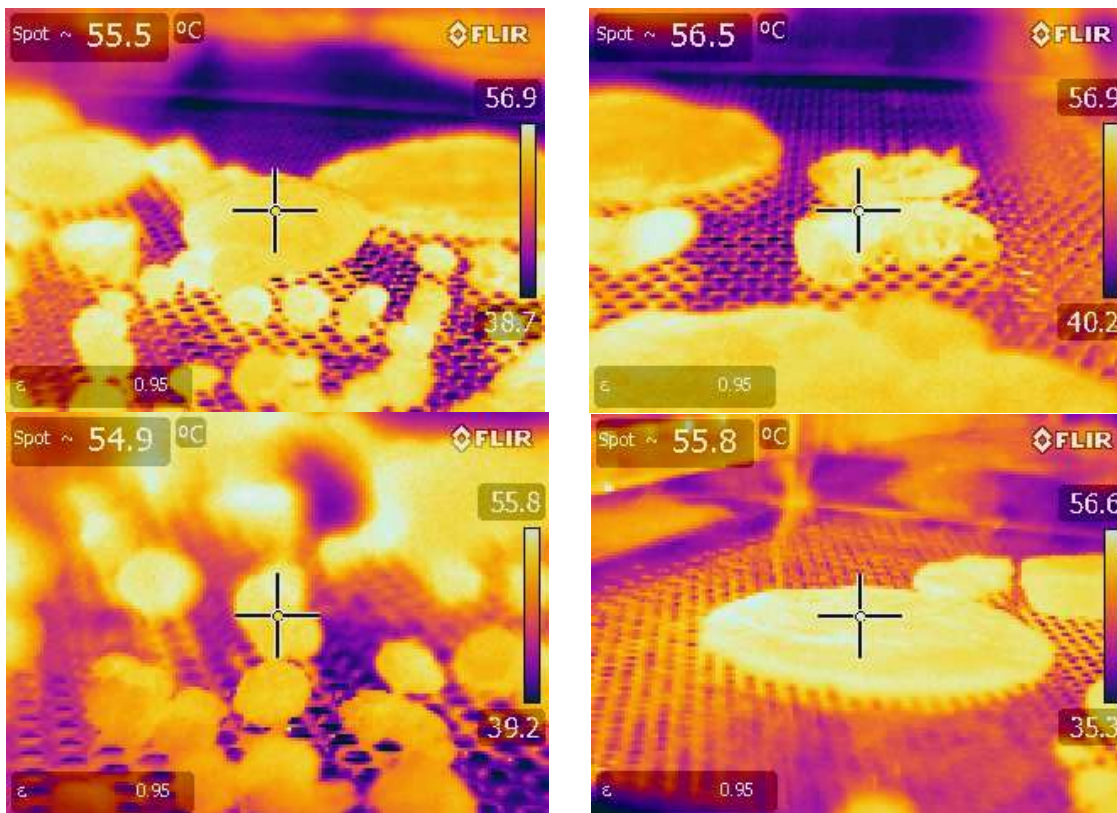
Initial on product temperature



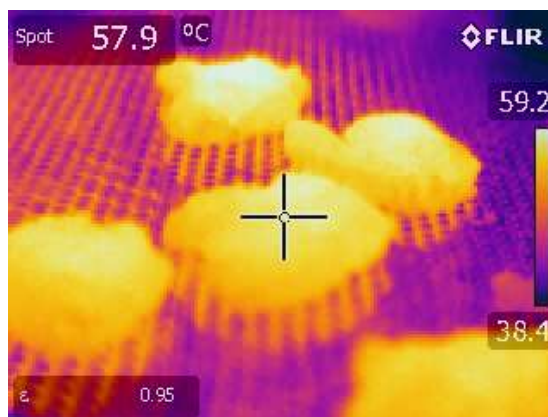
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Trial 1



Trial 2



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OBSERVATIONS:

The Drying behavior of Asafoetida has been investigated under the convection heating system. The results of drying the product in different forms was that the small balls and flattened product drying rate was higher than the small sectioned and spheroidal once. As per physical investigation, it has been observed, that there is no effect on its odour, but some changes in the colour without charring. In microwave heating system experiment, the colour was changed and become lighter and also baking of sample was observed.

Ms. Sayali Asole
Tested By