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In Association With



ELECTRO MAGNETIC innovative technologies

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



**Batch Microwave Heat Treatment for
Dehydration of Figs**

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



EMITECH S.p.A. - Via S. Rocco 10 - 20139 Milano (Italy)



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Customer :	M/s Khetimantra Agritech
Process :	Batch Microwave+Convection Heat Treatment for Dehydration of Figs

TEST REPORT No: 47/KRDC/LAB/17 Mum 20/08/2020

Date Sample reception : 20/08/2020

ID : 47/LAB/163

SAMPLE DESCRIPTION:

Sampling : As Requested

Sample Condition : Acceptable

Quantity : 5 kg.

Sampling date : 24/08/2020

Product : Whole Figs

Requirement : Drying

Start Date test : 20/08/2020

End Date test : 24/08/2020

LABORATORY EXPERIMENTAL SET UP:



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BATCH MICROWAVE HEATING SYSTEM SPECIFICATIONS:

Microwave Power	3 kW(CW)
Frequency	2450 MHz \pm 50
Convective Power	1.5 kW (air flow 350 l/min at 20°C)
Microwave Exposure Zone (Cavity)	650 mm x 650 mm x 400 mm
Thermal Monitoring System	Single Channel Fiber Optic: Range -40 to 250°C
Exhaust Power	1HP
Turntable Size	Ø 550 mm

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (degree C)	31°C (\pm 5°C)
Humidity (%)	\leq 75% 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



EMITECH ANALYTICAL LABORATORIES

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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
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
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 given sample of ripe & unripe figs to speed up the heating rate for drying treatment. For this experimental run, given sample has been placed in batch microwave hybrid heating system for different setting parameters to achieve required drying rate. The observations are made on the basis of temperature on product, total weight loss and any damage to product samples.



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ANALYTICAL RESULTS:

1) Trial A:

Microwave Power: 1.3 kW

Hot Air Temperature: 60°C

Initial Moisture Content: 83.3%.

Initial Weight: 520 gm.

Cycle time (min)	Final Wt. (gm)	Total Wt. Loss (gm)	Surface Temperature	Remarks
After 15	411	109	65-70	Drying rate started
After 30	304	107	70-75	Drying phase continues
After 45	123	181	70-75	Variant of Drying rate
After 60	116	107	80-85	Dried

Total Wt. Loss: 404 gm.

Final Moisture Content: 28.7%

2) Trial B:

Microwave Power: 1.16 kW

Hot Air Temperature: 55°C

Initial Moisture Content: 83.3%.

Initial Weight: 224 gm.

Cycle time (min)	Final Wt. (gm)	Total Wt. Loss (gm)	Surface Temperature	Remarks
After 60	79	145	60-65	Drying rate started
After 15	57	22	65-70	Dried

Total Wt. Loss: 167 gm.

Final Moisture Content: 20%



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MOISTURE ANALYSIS REPORTS:

Drying parameters	
Product	: Test
Drying temperature	: 105.0 °C
Drying profile	: standard
Mode	: Short mode
Calculation	: $\{[(W-W_0)/W_0]*100\}$
Finished	: 3 samples
Initial weight	: 1.875 g
Final weight	: 0.314 g
Drying time	: 01:24:40s
Sampling interval	: 30 sec
Moisture	: 82.8 %

NOTE: Initial Moisture Content

The analysis performed by:

BEFORE AND AFTER PICTURES OF TREATED SPCIMEN SAMPLE:

Before:



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The value obtained is already corrected for possible recover value stated, if applicable. This document may not be reproduced or disclosed wholly or partly in any part thereof without the written consent of the laboratory management or customer. This document relates only to the specimen samples processed. The processed sample will be kept in this laboratory for 7 days from the date of heat treatment.



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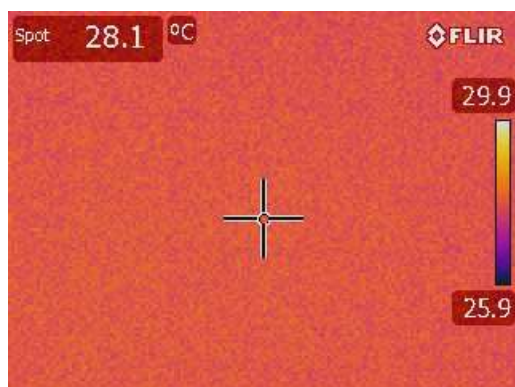
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After:



THERMAL IMAGE BEFORE AND AFTER HEAT TREATMENT:

Before Heat Treatment:



After Heat Treatment:



OBSRVATIONS:

The heating behavior of fig samples has been investigated under the microwave+convection heating mode for drying treatment. It has been found that the moisture content on the dry basis (%) decreases with respect to increase drying time. In the processed sample, as per physical investigation, it has been observed that there is no colour degradation on sample with required temperature on product.

K Komal

Miss. Komal Bhoite
Tested By

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