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ISO-9001-2008 COMPANY

Member Of



AIMCAL (USA)



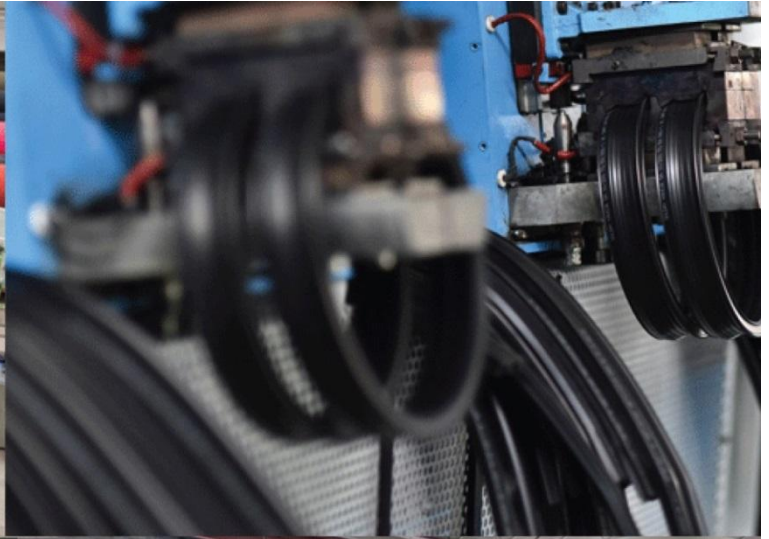
A.M.P.E.R.E (EUROPE)

In Association With



ELECTRO MAGNETIC innovative technologies

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



**Batch Microwave+Convection Heat
Treatment for Drying of Flowers**



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



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Customer :	M/s. Omni Active
Process :	Batch Microwave+Convection Heat Treatment for Drying of Flowers

TEST REPORT No: 47/KRDC/LAB/17 Mum 14/01/2019

Date Sample reception : 14/01/2019
ID : 47/LAB/79

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : 10 kg
Sampling date : 14/01/2019
Product : Marigold Flowers
Requirement : Final product must have moisture content less than 10%
Start Date test : 14/01/2019
End Date test : 14/01/2019

LABORATORY EXPERIMENTAL SET UP:



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LAB BATCH MICROWAVE+CONVECTION HEATING SYSTEM SPECIFICATIONS:

Microwave Power	2 kW(CW)
Frequency	2450 MHz \pm 50
Convective Power	3.5 kW (air flow 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	1HP
Tray Size	450x950x50 mm

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (degree C)	28.5°C (\pm 5°C)
Humidity (%)	\leq 64% 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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EQUIPMENTS USED:

Name of Equipment	Picture of Equipment	Specifications
Compact Thermal Imaging Camera		Model :FLIR E-30 Resolution: 160x 120IR 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 given flowers without adding any additive to speed up the drying rate. For this experimental run, the given sample of flowers has been placed on tray with uniform arrangement and heating treatment with suitable setting parameters has been given. Observations are made on physical appearance of flowers. Initial moisture content, final moisture content after heat treatment has been noted.

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ANALYTICAL RESULTS:

	Trial No. 1	Trial No. 2	Trail No. 3
Microwave Power (kW)	1	1.5	2
Setting Temp (°C)	60	70	80
Cycle Time (minutes)	110	60	40
Temperature on Product (°C)	50-60	60-70	70-80
Final Moisture of Whole Flower (%)	8	3.2	17.9
Final Moisture of Petals (%)	4.5	6.7	7

THERMAL IMAGE BEFORE AND AFTER HEAT TREATMENT:

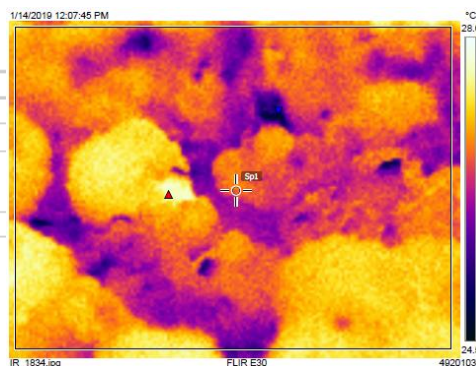
1. Before Heat Treatment:

Measurements

Bx1	Max	28.4 °C
	Min	24.5 °C
	Average	27.0 °C
Sp1		26.9 °C

Parameters

Emissivity	0.95
Refl. temp.	20 °C



2. After Heat Treatment:

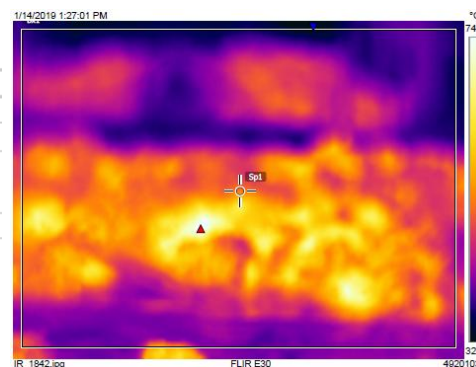
a) Trial No. 1:

Measurements

Bx1	Max	76.2 °C
	Min	33.5 °C
	Average	48.4 °C
Sp1		53.5 °C

Parameters

Emissivity	0.95
Refl. temp.	20 °C



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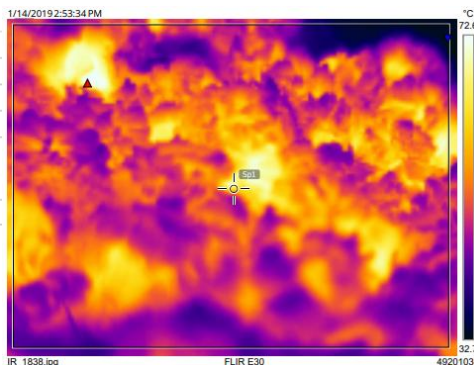
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b) Trial No. 2:

Measurements		
Bx1	Max	72.9 °C
	Min	32.7 °C
	Average	51.8 °C
Sp1		62.7 °C

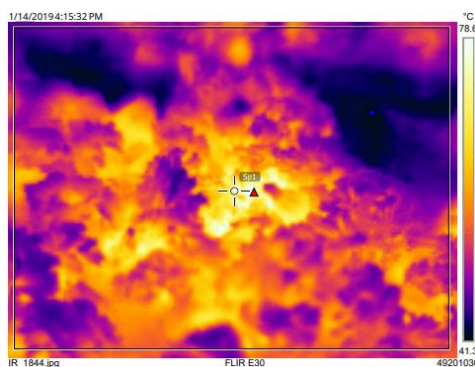
Parameters	
Emissivity	0.95
Refl. temp.	20 °C



c) Trial No. 3:

Measurements		
Bx1	Max	82.1 °C
	Min	41.0 °C
	Average	53.5 °C
Sp1		78.4 °C

Parameters	
Emissivity	0.95
Refl. temp.	20 °C



BEFORE AND AFTER PICTURES OF TREATED SPECIMEN SAMPLE:



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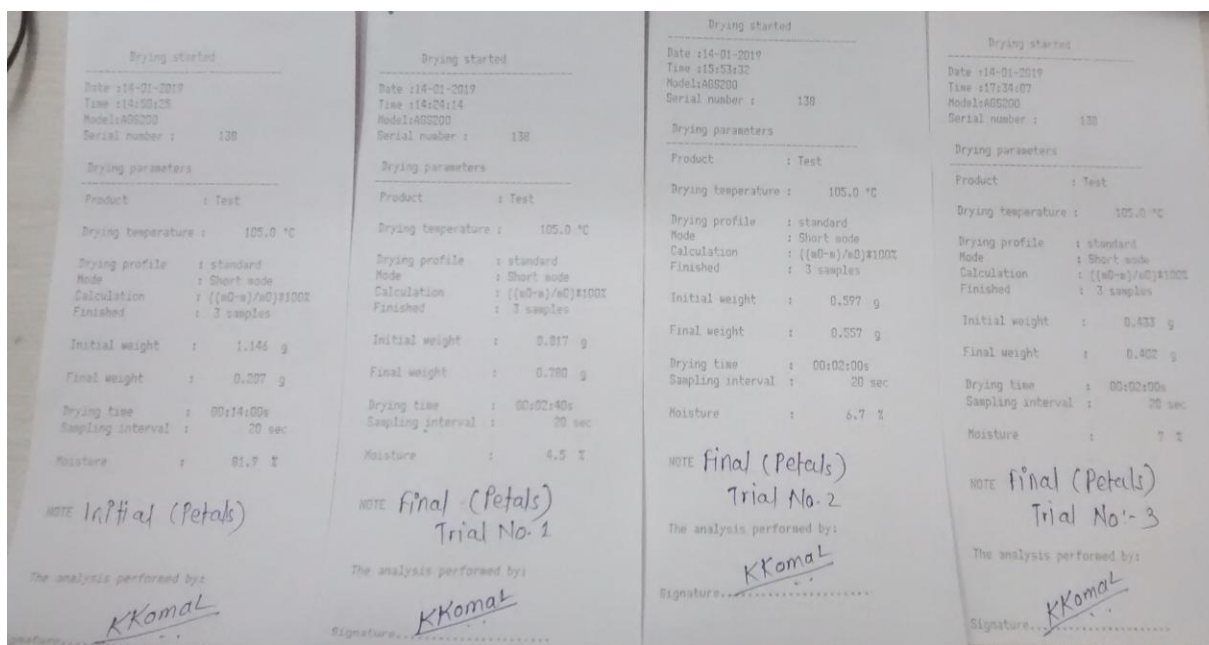
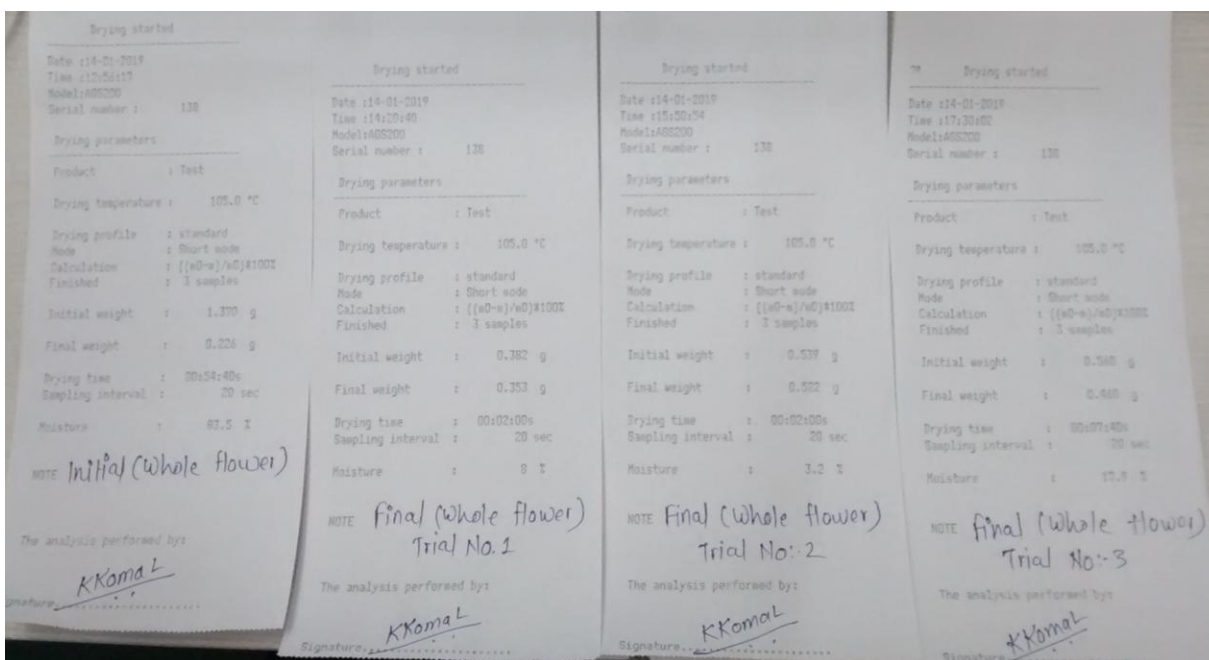


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MOISTURE ANALYSIS REPORTS:



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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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OBSRVATIONS:

The Drying behavior of Marigold flower has been investigated under the microwave+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, it has been observed that there is crunchiness in texture without burning and there is little colour change with required final moisture content.

A handwritten signature in black ink that reads "K Komal".

Miss Komal Bhoite
Tested By

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