

A CRISIL-NSIC RATED COMPANY ISO-9001-2008 COMPANY



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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



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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 ± 50	
Convective Power	3.5 kW (air flow 350 l/min at	
	20°C)	
Microwave Exposure Zone	1 cubic meter	
(cavity)		
(cavity)		
Mode Stirrer	One	
	one	
Thermal Monitoring System	Single Channel Fiber Optic:	
	Range -40 to 250°C	
	5	
Exhaust Power	1HP	
Tray Size	450x950x50 mm	

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (degree C)	28.5°C (±5°C)	
Humidity (%)	≤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	THE REAL PROPERTY OF THE PROPE	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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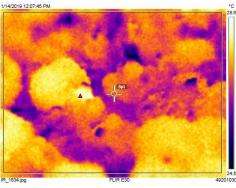
ANALYTICA L RESULTS:

	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:

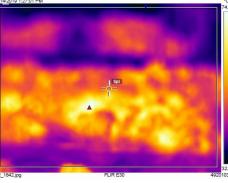
Measurements		
Bx1	Max	28.4 °C
	Min	24.5 °C
	Average	27.0 °C
Sp1		26.9 °C
Parameters		
Emissivity		0.95
Refl. temp.		20 °C



2. After Heat Treatment:

a) Trial No. 1:

Measurements			1/14/2019 1:27:01
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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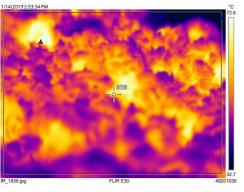


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b) Trial No. 2:

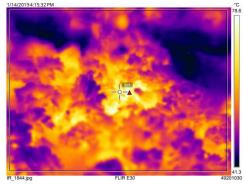
Measurements		
Bx1	Max	72.9 °C
	Min	32.7 °C
	Average	51.8 °C
Sp1		62.7 °C
Parameters		
Emissivity		0.95
Refl. temp.		20 °C



c) Trial No. 3:

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

Moosuromonte



BEFORE AND AFTER PICTURES OF TREATED SPECIMEN SAMPLE:





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MOISTURE ANALYSIS REPORTS:

	Drying started	Drying started	79 Drying started
	Tate :14-01-2019 Time :14:20:40 Madel:400500 Serial number : 138	Date :14-01-2019 Time :15:50:54 Model:465200 Serial number : 130	Date 114-01-2019 Time 117:30:00 Model:4555200 Derial manher 1 130
	Drying purameters	Drying parameters	Drying purameters
Drying temperature : 105.0 °C	Product : Test	Product : Test	
	Drying tesperature : 105.0 °C	Drying temperature : 105.0 °C	Drying temperature : 105.0 °C
	Brying profile : standard Node : Short sode	Brying profile : standard Mode : Short mode	Drying profile : standard
Initial unight r 1.370 g	Calculation : ((#0-#)/#0)#1002 Finished : 3 samples	Calculation : [[00-m]/u0]#1002 Finished : I samples	Mode : Short auds Calculation : ((sD-s)/sD)%IDE Finished : 3 usecles
Final weight : 0.226 g	Initial weight : 0.382 g	Initial weight : 0.537 g	Initial weight : 0.540 g
Drying time : 00±54:40s Empling interval : 20 sec	Final weight : 0.353 g	Final weight 1 0.502 g	Final weight a 0.660 g
Moisture : 83.5 I	Drying time : 00:02:00s Sampling interval : 20 sec	Drying time : 00:02:00s Sampling interval : 20 sec	Drying time : 00:07:40s Sampling interval : 20 met
me milial (whole flower)	Maisture : 8 %	Maisture : 3.2 %	Maisture t 12.0 %
e analysis performed by:	NOTE Final (Whole flower) Trial No. 1	NOTE Final (Whole flower) Trial No: 2	NOTE Final (Whale Hower) Trial No:-3
KKomat	The analysis performed by:	The analysis performed by:	The analysis performed by:
	KKomaL	KKomal	womat

		Drying started	
Brying started	Drying started	Bate :14-01-2019 Time :15:53:32	
Dube :14-01-2017 Time :14:50:25 Model:#45500 Berial number : 138	Date :14-01-2019 Time :14:20:14 Nodel:A65200 Serial number : 138	Nodela85200 Serial number : 139 Drying parameters	Date :14-01-2019 Time :17:34:07 Hodel:A65500 Serial number : 130
	Drying parameters	Product : Test	Drying parameters
	Product : Test	Drying temperature : 105.0 °C	Product : Test
Drying temperature : 105.0 °C	Drying temperature : 105.0 °C	Drying profile : standard	Drying temperature : 105.0 °C
Srying profile i standard Mode i Short mode Calculation i ((mG-m)/m0)#1902	Dryżką profile z standard Mode : Short mode Calculation : ((w0-w)/w0)#1002	Mode : Short mode Calculation : ((HG-m)/mD)#100% Finished : 3 samples Initial weight : 0.597 g	Drying profile : standard Mode : Short wode Calculation : ((wD-m)/wD)#1001 Finished : 3 samples
Finished : 3 samples Instial weight : 1.146 g	Finished : I samples Initial weight : 0.817 g	Final weight : 0.557 g	Initial weight : D.633 g
Final weight : 0.207 g	Final weight s 0.780 g	Drying time : 00:02:00s Sampling interval : 20 sec	Final weight : 0.402 g Drying time : 00:02:00s
Drying time : 00:14:00s Sampling interval : 20 sec	Drying time : 00:02:40s Sampling interval : 20 sec	Moisture : 5.7 %	Sampling interval : 20 set Moisture : 7 2
Moistare : 81.7 1	Maisture : 4.5 %	MOTE Final (Petals)	
MOTE Initial (Petals)	MOTE Final (Petals) Trial No. 1	Trial No. 2 The analysis performed by:	MOTE Final (Peterls) Trial No:-3
he analysis performed by:	The analysis performed by:	KKomaL	The analysis performed by:
KKomal	Stonature KKomat	arguaturenses	Signature

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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.

'Komal

Miss Komal Bhoite Tested By

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