

Kerone Research & Development Centre (KRDC), B/47, Addl. MIDC. Anand Nagar, Ambarnath (East), Thane- 421 506, India
Tel- +91-251-2620542/13/44/45/46, Email-info@kerone.com, www.kerone.com

Customer :	M/s. DARSHAN INTERNATIONAL, BANGALORE
Process :	Batch Vacuum Microwave Dehydrator Treatment for Drying of Marigold,Rose,Mogra & Champa flower Petals

TEST REPORT No: 47/KRDC/LAB/17 Mum 30/07/2021

Date Sample reception : 30/07/2021
ID : 47/LAB/14

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : 350 g
Sampling date : 30/07/2021
Product : Fresh Marigold, Rose, Mogra &Champa flowers
Requirement : To be Dried completely
Start Date test : 30/07/2021
End Date test : 30/07/2021

LABORATORY EXPERIMENTAL SET UP:



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LAB BATCH MICROWAVE HEATING SYSTEM SPECIFICATIONS:

Magnetron Power Generator Rating	Air Cooled 1.45KW/2450+50 MHZ x 1 No.
Convection Power	1.5 KW
Total Heater Power	3KW (MW 1.45KW + Convection 1.5KW)
Supply Voltage required	230V 2Ph supply
MW Overall (LxWxH) in mm	620X670X640
Cavity Chamber (INNER) in mm	L-300 & Ø220
Vacuum Pump Rating	560W, 220V/50Hz, 2880rpm
Free Air Displacement	10.7 CFM
Vacuum Pump (LxWxH)	430x200x300

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (degree 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: 160 x 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

EXPERIMENT NO.1: MARIGOLD PETALS

SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on Marigold petals to speed up the drying rate. For this experimental run, product has been placed on a perforated tray and then kept in Batch Vacuum Microwave Dehydrator system. The observations are made after every 10 minutes. Also, initial weight before drying, final weight after drying, initial moisture content & final moisture content is recorded.

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ANALYTICAL RESULTS:

Initial Wt. - 150g

Initial moisture – 87.5%

Microwave Power: 1.16 kW (80% Capacity)

Heater: 90°C (switch 1)

Cycle Time- 10 mins

Cycle Time	Weight noted (grams)	Total weight loss(grams)	Total weight loss(in %)	Remarks, if any
After 10min	68	82	54.66%	Drying rate started
After 20min	32	36	52.94%	Drying continues
After 25min	22	10	31.25%	Variant of Drying
After 30min	19	3	13.63%	Drying completes

Final weight after drying: 19 grams

Final Moisture Content: 6.7%

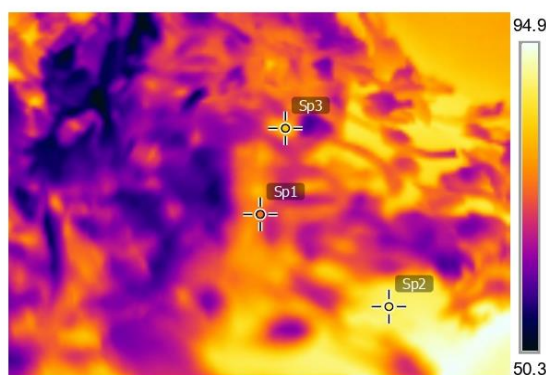
THERMAL ANALYSIS REPORTS: After 1st cycle-

Measurements

Sp1	76.6 °C
Sp2	89.0 °C
Sp3	83.2 °C

Parameters

Emissivity	0.95
Refl. temp.	20 °C



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MOISTURE ANALYSIS REPORTS:

Drying started		Drying started	
Date :30-07-2021		Date :30-07-2021	
Time :11:59:34		Time :14:20:00	
Model:AGS200		Model:AGS200	
Serial number : 130		Serial number : 130	
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 : 1.004 g		Initial weight : 0.506 g	
Final weight : 0.125 g		Final weight : 0.472 g	
Drying time : 00:11:20s		Drying time : 00:02:00s	
Sampling interval : 20 sec		Sampling interval : 20 sec	
Moisture : 87.5 %		Moisture : 6.7 %	
NOTE Initial moisture of Marigold (Trial- 2) petals The analysis performed by: 0 Signature: <i>Komal</i>		NOTE final moisture of marigold petals, treated in vacuum MW (Trial-2) The analysis performed by: 0 Signature: <i>Komal</i>	

AFTER PICTURES OF TREATED SPECIMEN SAMPLE



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Untreated**Treated****OBSERVATIONS:**

The Drying behavior of marigold petals has been investigated under the Vacuum MW Dehydrator 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 and colour is retained to some extent.

EXPERIMENT NO.2: ROSE PETALS**SAMPLE PREPARATION AND METHOD/PROCEDURE:**

The experiment has been performed on Rose petals to speed up the drying rate. For this experimental run, product has been placed on a perforated tray and then kept in Batch Vacuum Microwave Dehydrator system. The observations are made after every 30 minutes. Also, initial weight before drying, final weight after drying, initial moisture content & final moisture content is recorded.

ANALYTICAL RESULTS:**Initial Wt. - 30g****Initial moisture – 87.3%****Microwave Power: 1.16 kW (80% Capacity)****Heater: 90°C (switch 1)****Cycle Time- 30 mins**

Cycle Time	Weight noted (grams)	Total weight loss(grams)	Total weight loss(in %)	Product Temp.(°C)	Remarks, if any
After 30min	4	26	86.66%	67.8°C	Dried

Final weight after drying: 4 grams**Final Moisture Content: 10%****Format: F/R&D/01**

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THERMAL ANALYSIS REPORTS:

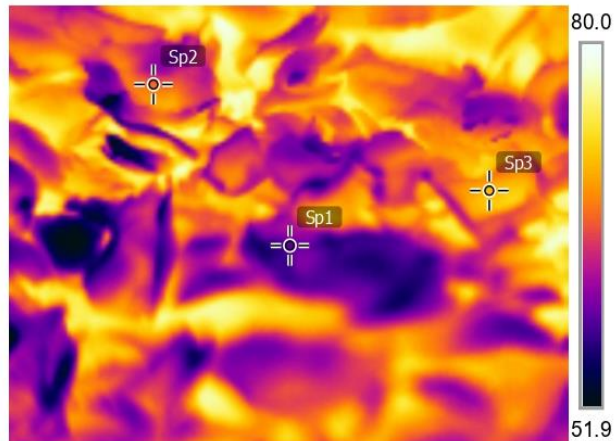
After 1st cycle-

Measurements

Sp1	58.8 °C
Sp2	67.5 °C
Sp3	71.3 °C

Parameters

Emissivity	0.95
Refl. temp.	20 °C



MOISTURE ANALYSIS REPORTS:

Drying started	Drying started
Date :30-07-2021	Date :30-07-2021
Time :12:39:44	Time :13:14:01
Model:AGS200	Model:AGS200
Serial number : 138	Serial number : 138
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 : 1.207 g	Initial weight : 0.142 g
Final weight : 0.153 g	Final weight : 0.128 g
Drying time : 00:11:40s	Drying time : 00:01:40s
Sampling interval : 20 sec	Sampling interval : 20 sec
Moisture : 87.3 %	Moisture : 10 %
NOTE Initial moisture of Rose petals	NOTE final moisture of Rose petals treated in Vacuum Mw + Convection. for 30mins
The analysis performed by: 0	The analysis performed by: 0
Signature..... <i>Komal</i>	Signature..... <i>Komal</i>

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AFTER PICTURES OF TREATED SPECIMEN SAMPLE:



Untreated



Treated

OBSERVATIONS:

The Drying behavior of Rose petals has been investigated under the Vacuum MW Dehydrator 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 the petals are dried completely without any burning and colour change is acceptable.

EXPERIMENT NO.3: MOGRA+CHAMPA FLOWERS

SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on mogra and champa to speed up the drying rate. For this experimental run, product has been placed on a perforated tray and then kept in Batch Vacuum Microwave Dehydrator system. The observations are made after every 20-30 minutes. Also, initial weight before drying, final weight after drying, initial moisture content & final moisture content is recorded.

ANALYTICAL RESULTS:

Initial Wt. - 200g

Initial moisture – 86.9%

Microwave Power: 1.16 kW (80% Capacity)

Heater: 80°C (switch 1)

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Cycle Time- 30 mins

Cycle Time	Weight noted (grams)	Total weight loss(grams)	Total weight loss(in %)	Product Temp.(°C)	Remarks, if any
After 30min	86	114	57%	(50-55)°C	Drying started
After 50min	40	46	53.48%	(60-65)°C	Drying continues
After 1 Hr 10min	32	8	20%	(65-70)°C	Dried

Final weight after drying: 32 grams

Final Moisture Content of mogra: 8%

Final Moisture Content of champa: 15%

THERMAL ANALYSIS REPORTS:

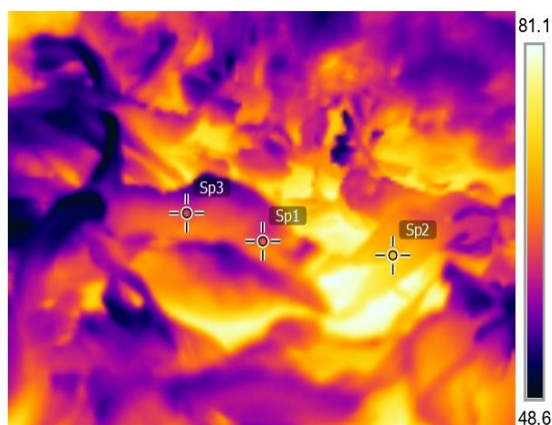
After 2nd cycle-

Measurements

Sp1	63.8 °C
Sp2	71.3 °C
Sp3	62.9 °C

Parameters

Emissivity	0.95
Refl. temp.	20 °C



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MOISTURE ANALYSIS REPORTS:

Drying started		Drying started		Drying started	
Date :30-07-2021		Date :30-07-2021		Date :30-07-2021	
Time :15:22:10		Time :15:57:16		Time :16:02:18	
Model:AGS200		Model:AGS200		Model:AGS200	
Serial number : 138		Serial number : 138		Serial number : 138	
Drying parameters		Drying parameters		Drying parameters	
Product : 0		Product : 0		Product : 0	
Drying temperature : 105.0 °C		Drying temperature : 105.0 °C		Drying temperature : 105.0 °C	
Drying profile : standard		Drying profile : standard		Drying profile : standard	
Mode : Short mode		Mode : Short mode		Mode : Short mode	
Calculation : $((m_0-m)/m_0)*100\%$		Calculation : $((m_0-m)/m_0)*100\%$		Calculation : $((m_0-m)/m_0)*100\%$	
Finished : 3 samples		Finished : 3 samples		Finished : time over	
Initial weight : 1.733 g		Initial weight : 0.401 g		Initial weight : 0.533 g	
Final weight : 0.227 g		Final weight : 0.370 g		Final weight : 0.453 g	
Drying time : 00:20:00s		Drying time : 00:02:20s		Drying time : 00:02:40s	
Sampling interval : 20 sec		Sampling interval : 20 sec		Sampling interval : 20 sec	
Moisture : 86.9 %		Moisture : 8 %		Moisture : 15.0 %	
NOTE Initial of Mogra and Champa.		NOTE final moisture of Mogra.		NOTE final moisture of Champa.	
The analysis performed by: 0		The analysis performed by: 0		The analysis performed by: 0	
Signature..... <i>Kugle</i>		Signature..... <i>Komal</i>		Signature..... <i>Komal</i>	

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AFTER PICTURES OF TREATED SPECIMEN SAMPLE:



Untreated



Treated

OBSERVATIONS:

The Drying behavior of mogra and champa flowers has been investigated under the Vacuum MW Dehydrator 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 the petals are dried completely and colour change is acceptable.



Ms. Komal Ingle

(Tested By)

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