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Kerone Research & Development Centre (KRDC)
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Batch Vacuum Microwave Heat Treatment for Puffing of Dried Fruits

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Customer :	**M/s. Elven Agri Co. Ltd.**
Process :	**Batch Vacuum Microwave Heat Treatment for Puffing of Dried Fruits**

Test Report No*: *155/KRDC/LAB/17 Mum 15/11/2022

Date Sample reception : 03/09/2022
ID : 155/LAB/15

***Sample Description*:**

Sampling : As Requested
Sample Condition : Acceptable
Sampling date : 12/11/2022
Product : Dried Pineapple
Start Date test : 12/11/2022
End Date test : 12/11/2022

Laboratory Experimental System –

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System Specifications -

Magnetron Power Generator Rating	Air Cooled 1.45KW/2450+50 MHZ x 1 No.
Convection Power	1.5 KW
Total Heater Power	3 KW (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 & Φ220
Vacuum Pump Rating	1/2HP,1440rpm

Laboratory's Environmental Conditions –

Temperature (degree C)	29.4ºC (±5ºC)
Humidity (%)	≤50% 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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Equipment 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**
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**
Moisture Analyzer		**Make: Axis Balance** **Description:** **Moisture range: 1%(sample 0.02/0.05g), 0.1% (Sample 0.5/5g), 0.01%(Sample>5g)**

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Procedure of the Experiment -

- The experiment was performed on Dehydrated Fruits to speed up the heating rate.
- For this experimental run, the sample was placed in the MW heating system with suitable parameters.
- After the heating treatment, the sample was analyzed.

Analytical Results:

Sample 2 – Pineapple

Trials	Sample Wt. (gms.)	Initial Moisture (%)	Cycle Time	Specifications of Microwave	Final Moisture (%)	Remark
1	50	4.7	5 mins.	MW intensity: 100%; Set temp: 60ºC; Vacuum:300mmHg	1.2	Charring Puffing effect observed On product temp: (130-160)˚C
2	50	4.7	2 mins.+ 2 mins	MW intensity: 100%; Set temp: 60ºC; Vacuum:300mmHg	1.5	No charring Puffing effect observed On product temp: (100-115) ˚C No. of Cycle: 2
3	50	4.7	4 mins	MW intensity: 100%; Set temp: 60ºC; Vacuum:300mmHg	1.9	Some charring Puffing effect observed On product temp: (130-140)˚C
4	50	4.7	3 mins	MW intensity: 100%; Set temp: 60ºC; Vacuum:200mmHg	1.3	Slight charring Slight Puffing effect observed On product temp: (140-150)˚C
5	50	4.7	2 mins	MW intensity: 100%; Set temp: 60ºC; Vacuum:100mmHg	3.4	Slight charring Slight Puffing effect observed On product temp: (135-140)˚C

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Trial images:

Untreated Sample (Pineapple)

Treated Sample (Trial 1, Trial 2, Trial 3)

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Treated Sample (Trial 4, Trial 5)

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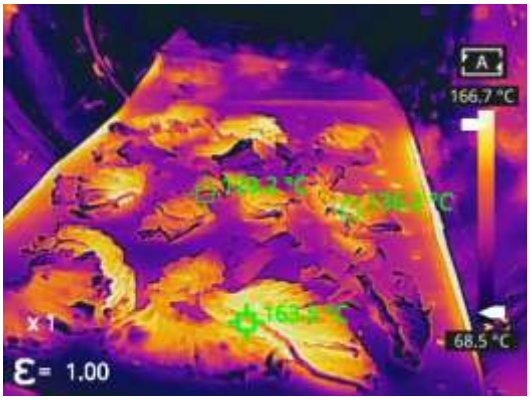
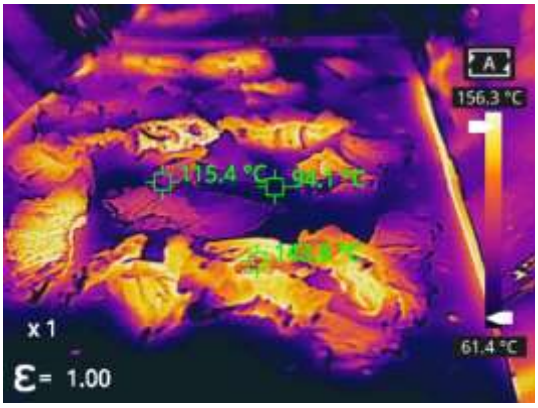
Thermal Images:

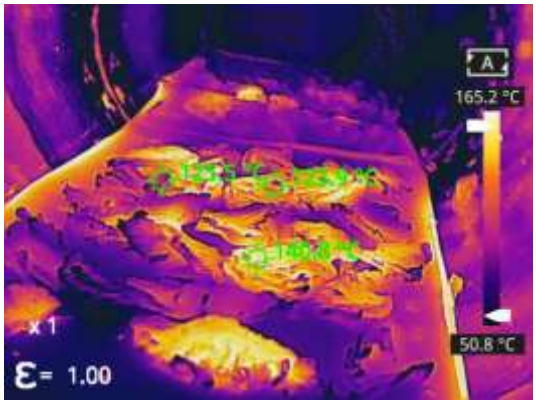
Measurements	
Sp1	129.2°C
Sp2	136.2°C
Sp3	163.5°C
Parameters	
Emissivity	1.00
Temp.	166.7°C



Measurements	
Sp1	115.4°C
Sp2	143.8°C
Sp3	94.1°C
Parameters	
Emissivity	1.00
Temp.	156.3°C



Measurements	
Sp1	125.5°C
Sp2	123.9°C
p3	140.8°C
Parameters	
Emissivity	1.00
Temp.	165.2°C



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Moisture Analysis Report:

Trial 1 **Trial 2**

Drying started

Date :12-11-2022
Time :12:55:02
Model:AGS200
Serial number : 138

Drying parameters

Product : 0
Drying temperature : 105.0 °C
Drying profile : standard
Mode : Short mode
Calculation : ((n0-n)/n0)*100%
Finished : 3 samples
Initial weight : 0.843 g
Final weight : 0.803 g
Drying time : 00:06:40s
Sampling interval : 20 sec
Moisture : 4.7 %

NOTE Initial moisture

The analysis performed by:

Signature.....

Drying started

Date :12-11-2022
Time :13:47:47
Model:AGS200
Serial number : 138

Drying parameters

Product : 0
Drying temperature : 105.0 °C
Drying profile : standard
Mode : Short mode
Calculation : ((n0-n)/n0)*100%
Finished : 3 samples
Initial weight : 0.601 g
Final weight : 0.594 g
Drying time : 00:01:40s
Sampling interval : 20 sec
Moisture : 1.2 %

NOTE Final moisture

The analysis performed by:

Signature.....

Drying started

Date :12-11-2022
Time :15:43:12
Model:AGS200
Serial number : 138

Drying parameters

Product : 0
Drying temperature : 105.0 °C
Drying profile : standard
Mode : Short mode
Calculation : ((n0-n)/n0)*100%
Finished : 3 samples
Initial weight : 0.661 g
Final weight : 0.652 g
Drying time : 00:01:40s
Sampling interval : 20 sec
Moisture : 1.5 %

NOTE Final moisture

The analysis performed by:

Signature.....

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Trial 3 **Trial 4** **Trial 5**

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Observations:

The heating behavior of Dehydrated fruits was investigated under the Microwave heating system. The heating rate was found to be increasing with respect to the increase in time. As per the physical investigation, it was observed that the puffing and drying of the product were obtained as desired.

Ms. Sayali Asole
(Tested By)