





(EUROPE)

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:	

: As Requested
: Acceptable
: 12/11/2022
: Dried Pineapple
: 12/11/2022
: 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 & Ф220
Vacuum Pump Rating	1/2HP,1440rpm

Laboratory's Environmental Conditions -

Temperature (degree C)	29.4°C (±5°C)
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	Constant of the second se	Model No: HTC-2Temperature accuracy: ±°C (1.8°F)Temperature resolution: 0.1°C (0.2°F)Humidity range: 10%~99% RHHumidity accuracy: ±5% RHHumidity 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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ΙςΩ_9ΛΛ1_2ΛΛΑ ΓΩΜΡΔΝΥ

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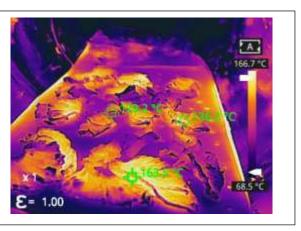
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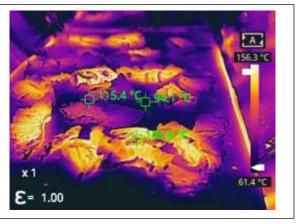
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Thermal Images:

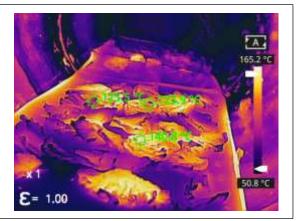
Sp1	129.2°C
Sp2	136.2°C
Sp3	163.5°C
Parameters	
Emissivity	1.00
Temp.	166.7°C



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



Sp1	125.5°C
Sp2	123.9°C
р3	140.8°C
Parameters	
Emissivity	1.00
Temp.	165.2°C



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Moisture Analysis Report:

Trial 1 Trial 2 Deyles startes Deputes address Drying started Date :12-11-2022 Date :17-11-2022 Date :12-11-2022 Time #12:55:22 Time :15:43:12 Time :13:47:47 30328\$15+bo Mode1:465200 Model:465200 Serial sundar : 138 Serial number : 133 Serial number : 138 Drying parameters Drying parameters Drying paraveture Fredect 1:0 Product 1.1 Product : 0 Drying temperature : Drying temperature : 105.0 10 105.0 *5 Drying temperature : 105.0 *0 Drying profile Drying profile 1. standard 1 standard Drying profile : standard Forte: Auda : Shart ande : Short apda Hode : Short side Calculation : ((n0~=)/=D)#(65% Calculation 1 ((x0-x)/s5)atoos : ((+0-+)/+0)#100% Calculation Finished Finished : 3 samples : 3 templet Finished : I samples Initial weight Initial Weight 0.843 g 1 21 0.661 6 Initial weight 0.601 0 Final weight Final weight 0.903 9 0.651 3 Final weight 0.594 g 1 Drying time Drying time 00:01:40s ÷ 00:06:404 Drying tipe 00:01:40: Sampling interval Sampling interval \$ 20 sec. 20 sec Sampling interval : 20 sec Maisture Maisture 4.7 % 1.5 1 Hoisture 1.2 % NOTE HOTE tinul mois The analysis performed by: The analysis performed by: The analysis performed by: Signature.... Signature... Signature

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Trial 3

Trial 4

Trial 5

tour; str		Drying starte	d	Degrag start		
ete stilltillit jer stilltillit periodistillit periodi Antoni a	135	Dete::12-11-2022 Tieo::15:48:41 Model:465200 Serial number :	135	Date :12-11-7022 Five :15:13:55 Hodel:455200 Serial number :	118	
Drying daramaters		Prying parameters		Drying parameters		
Preduce	: 0	Product		Product	: 3	
Drying texperature	105,0 10	Drying temperature	: 105.0 °C	Drying temperature		
irving profile Note Delouistice Firiahed	: standard : Start mode : ((mC+=)/hD]#100% : 2 sepis	Mode Calculation	t standard : Short wode t ((mC+n)/AO]#100% t 3 samples	Drying profile Mode Celculation	i stindare i Start sole i ((st-s)/odjatoot i Jasspiel	
Initial weight	1. 0.741 g	Initial seight	: 0.537 g	Initial weight	0.725 g	
Finel weight	t 0.727 g	Final weight	0,530 g	Final weight	0.703 a	
loying time Sengling interval	: 00:02:40; : 20 sec	Drying time Sampling interval	: 00:01:40s : 20 sec	Drying tiwe Sampling interval	: 00:03:20s	
loistire	: 1.9 2	Moisture	1.3 1	Moisture		
ore final	nioisture	NOTE Final W	noisture	NOTE Fined V	uoishare	
The analytis performed by:		The analysis perform	The analysis performed by:		The analysis performed by:	

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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)

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