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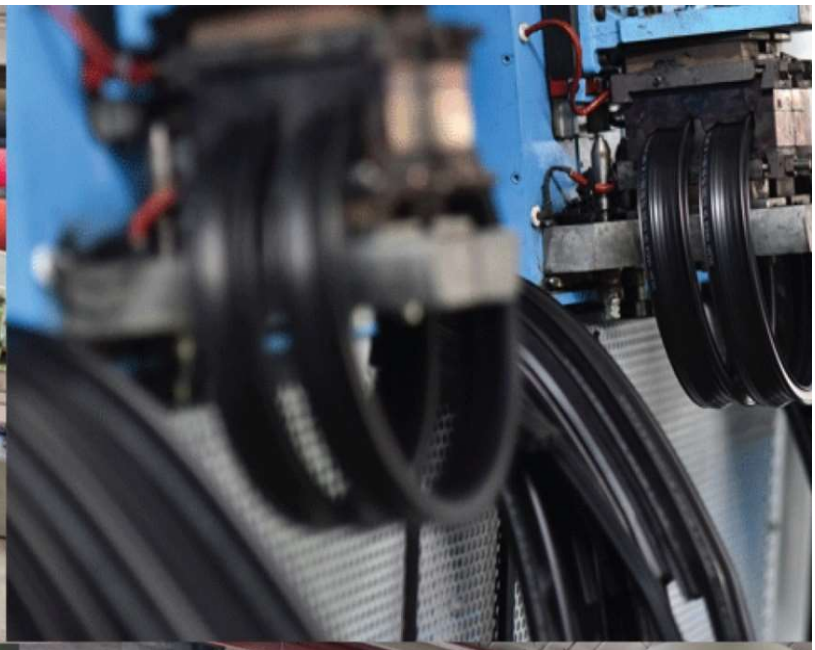
Kerone Research & Development Centre (KRDC)
B/47, Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/13/44/45/46, Email-info@kerone.com, www.kerone.com

Batch Microwave Heat Treatment for Sterilization of Caralluma Powder

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Customer:	
Process:	Batch Microwave Heat Treatment for Sterilization of Caralluma Powder

Test Report No*: *237/KRDC/LAB/17 Mum 04/10/2023

Date Sample reception : 08/07/2023
ID : KRDC/R&D/23-24/04/10

***Sample Description*:**

Sampling : As Requested
Sample Condition : Acceptable
Sampling date : 04/10/2023
Requirement : Sterilization of Caralluma Powder (03 Drums)
Start Date test : 04/10/2023
End Date test : 04/10/2023

Laboratory Experimental System -

System Specifications -

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Microwave Power	3.5 KW (CW)
Frequency	2450 MHz ± 50
Convective Power	3.5 KW (airflow 350 I/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	1 HP
Tray size (width*height*depth)	450*950*50 mm

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)**

Procedure of the Experiment -

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

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Analytical Results:

Trial 1 (AP-03)

Cycle	Sample Wt. (kgs.)	Cycle Time (mins.)	Specifications of Microwave	Remark
1	28.200	After 10 mins	Magnetron Power: 3.5 kW; Set temp: 80ºC	Warming up the drum On product temp: (30-32) ˚C
2	28.200	After 20 mins.	Magnetron Power: 3.5kW; Set temp: 80ºC	Heating Continuous On product temp: (35-39) ˚C
3	28.200	After 30 mins.	Magnetron Power: 3.5 kW; Set temp: 80ºC	Heating Continuous On product temp: (42-47)˚C
4	28.200	After 40 mins.	Magnetron Power: 3.5 kW; Set temp: 80ºC	Heating Continuous On product temp: (52-65)˚C
5	28.200	After 50 mins.	Magnetron Power: 3.5 kW; Set temp: 80ºC	Heating Continuous On product temp: (70-75)˚C
6	28.200	After 60 mins.	Magnetron Power: 3.5 kW; Set temp: 80ºC	Temperature achieved as desired On product temp: (80-84)˚C

Trial 2 (AE-07)

Cycle	Sample Wt. (kgs.)	Cycle Time (mins.)	Specifications of Microwave	Remark
1	27.120	After 10 mins	Magnetron Power: 3.5 kW; Set temp: 80ºC	Warming up the drum On product temp: (30-41) ˚C
2	27.120	After 20 mins.	Magnetron Power: 3.5kW; Set temp: 80ºC	Heating Continuous On product temp: (44-50) ˚C
3	27.120	After 30 mins.	Magnetron Power: 3.5 kW; Set temp: 80ºC	Heating Continuous On product temp: (53-59)˚C
4	27.120	After 40 mins.	Magnetron Power: 3.5 kW; Set temp: 80ºC	Heating Continuous On product temp: (60-68)˚C
5	27.120	After 50 mins.	Magnetron Power: 3.5 kW; Set temp: 80ºC	Heating Continuous On product temp: (70-78)˚C
6	27.120	After 60 mins.	Magnetron Power: 3.5 kW; Set temp: 80ºC	Temperature achieved as desired On product temp: (78-81)˚C

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Trial 3 (BE-08)

Cycle	Sample Wt. (kgs.)	Cycle Time (mins.)	Specifications of Microwave	Remark
1	28.200	After 10 mins	Magnetron Power: 3.5 kW; Set temp: 80ºC	Warming up the drum On product temp: (30-35) ˚C
2	28.200	After 20 mins.	Magnetron Power: 3.5kW; Set temp: 80ºC	Heating Continuous On product temp: (40-43) ˚C
3	28.200	After 30 mins.	Magnetron Power: 3.5 kW; Set temp: 80ºC	Heating Continuous On product temp: (49-53)˚C
4	28.200	After 40 mins.	Magnetron Power: 3.5 kW; Set temp: 80ºC	Heating Continuous On product temp: (55-60)˚C
5	28.200	After 50 mins.	Magnetron Power: 3.5 kW; Set temp: 80ºC	Heating Continuous On product temp: (63-69)˚C
6	28.200	After 60 mins.	Magnetron Power: 3.5 kW; Set temp: 80ºC	Temperature achieved as desired On product temp: (74-80)˚C

***Trials Images*: (Treated Samples):**

Trial 1 (AP-03)

Trial 2 (AE-07)

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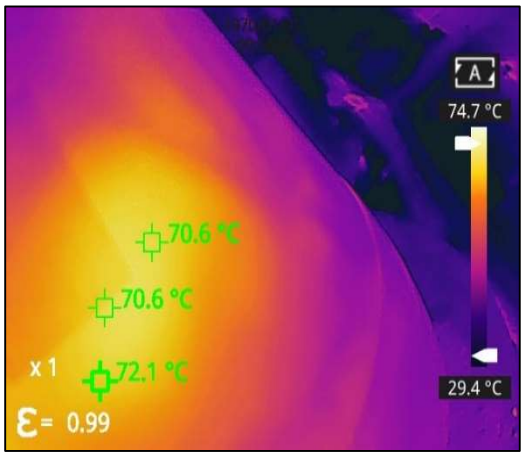
Trial 3 (BE-08)

Thermal images:

Measurements	
Sp1	70.6°C
Sp2	70.6°C
Sp3	72.1°C

Parameters	
Emissivity	0.99
Temp.	74.7°C



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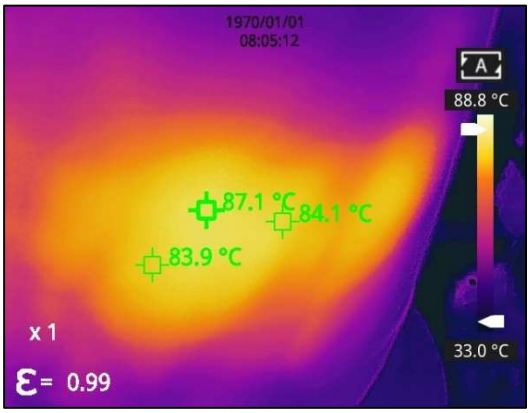
Measurements	
Sp1	87.1°C
Sp2	84.1°C
Sp3	83.9°C

Parameters	
Emissivity	0.99
Temp.	88.8°C



Observations:

The heating behavior of Caralluma Powder was investigated under the Microwave heating system. The heating rate was found to be increasing with respect to increasing in time. As per the physical investigation, it was observed that the sterilization of the product for up to 87˚C drum temperature was achieved without any Deformation of the drum and was seal packed during treatment. Sterilization of the product for 60 minutes was achieved with condensation and no charring effect.

Mrs. Priya Tayde

(Tested By)