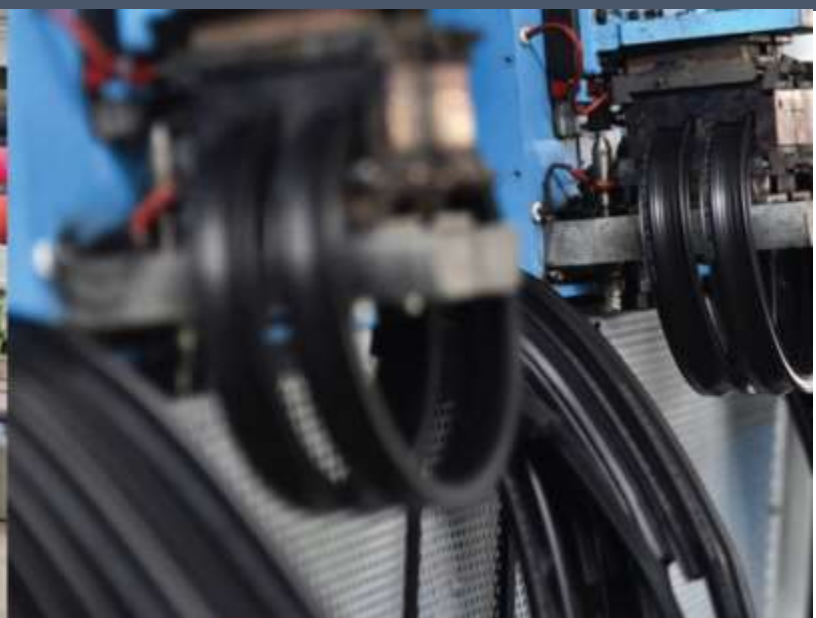


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**Batch Microwave Heat Treatment
for Sterilization of Herbal Powder**

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| | |
|------------|---|
| Customer : | M/s. Indfrag Biosciences Private Limited. |
| Process : | Batch Microwave Heat Treatment for Sterilization of Herbal Powder |

Test Report No: 133/KRDC/LAB/17 Mum 03/09/2022

Date Sample reception : 29/08/2022
ID : 133/LAB/03

Sample Description:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : 4 kg
Sampling date : 02/09/2022
Product : Herbal Powders
Start Date test : 02/09/2022
End Date test : 02/09/2022

Laboratory Experimental System -



System Specifications -

| | |
|---|---|
| Microwave Power | 2 KW (CW) |
| Frequency | 2450 MHz \pm 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) | 29.4°C (\pm 5°C) |
| Humidity (%) | \leq 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: $\pm^{\circ}\text{C}$ (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 |
| 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 Herbal powders to speed up the heating rate.
- The glass tray, and chamber, were wiped with 70% ethanol.
- For this experimental run, the given sample was taken in the sterilized glass tray and placed in the MW heating system with suitable parameters.
- After the heating treatment, the sample was analyzed.

Analytical Results:

| Trials | Product ID | Sample Wt. (gms.) | Specifications of Microwave | On product temp | Remark |
|--------|------------|----------------------|---|--------------------|-------------------------|
| 1 | MT(1) | 500 | Magnetron Power: 1 kW; Set temp: 100°C | (59-63) °C | Sterilized for 5 mints. |
| 2 | MT(2) | 500 | Magnetron Power: 2 kW; Set temp: 130°C | (61-63) °C | Sterilized for 3 mints. |
| 3 | MTAC | 1000 | Magnetron Power: 1 kW; Set temp: 100°C | (65-70) °C | Sterilized for 5 mints. |
| 4 | MTACP | 1000 | Magnetron Power: 2 kW; Set temp: 130°C | (65-70) °C | Sterilized for 3 mints. |
| 5 | BSP(1) | 500 | Magnetron Power: 1 kW; Set temp: 70°C | (39-40) °C | Sterilized for 7 mints. |
| 6 | BSP(2) | 500 | Magnetron Power: 2 kW; Set temp: 100°C | (51-58) °C | Sterilized for 5 mints. |

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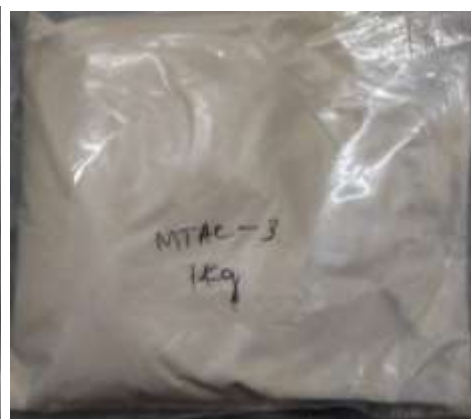
Trial Images:



Trial 1



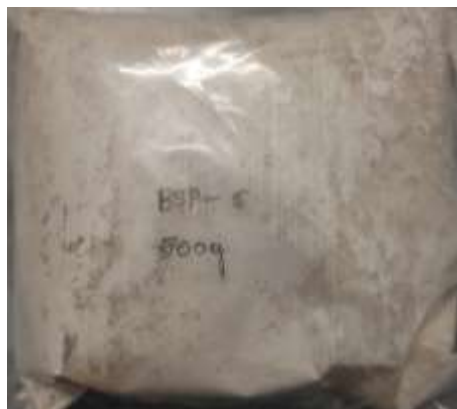
Trial 2



Trial 3



Trial 4



Trial 5



Trial 6

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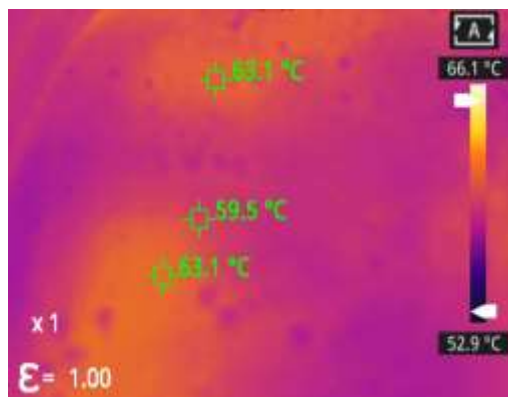
Thermal Images:

Measurements

| | |
|-----|---------|
| Sp1 | 63.1 °C |
| Sp2 | 59.5 °C |
| Sp3 | 63.1 °C |

Parameters

| | |
|------------|---------|
| Emissivity | 1.00 |
| Temp. | 66.1 °C |

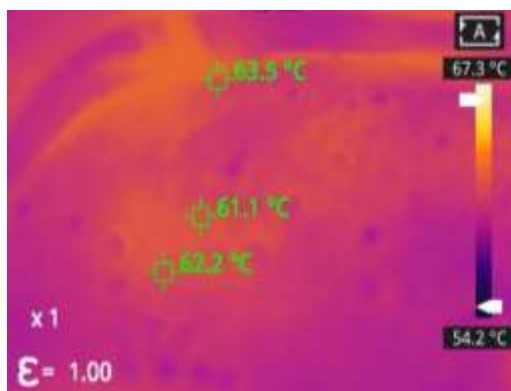


Measurements

| | |
|-----|---------|
| Sp1 | 63.5 °C |
| Sp2 | 61.1 °C |
| Sp3 | 62.2 °C |

Parameters

| | |
|------------|---------|
| Emissivity | 1.00 |
| Temp. | 67.3 °C |

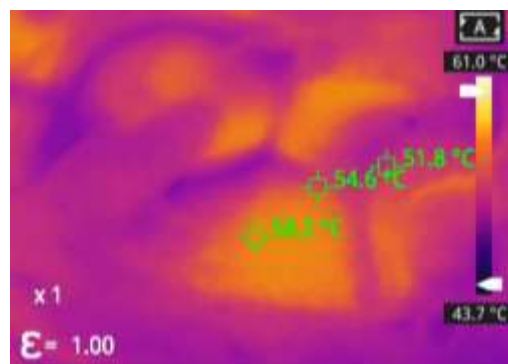


Measurements

| | |
|-----|---------|
| Sp1 | 51.8 °C |
| Sp2 | 54.6 °C |
| Sp3 | 58.2 °C |

Parameters

| | |
|------------|---------|
| Emissivity | 1.00 |
| Temp. | 61.0 °C |



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Observations:

The heating behavior of Herbal Powders 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 was achieved without any charring effect and was seal packed after treatment.



Ms. Sayali Asole
(Tested By)