KERONE

A CRISIL-NSIC RATED COMPANY
ISO-9001-2008 COMPANY

Member Of

AIMCAL (USA) A.M.P.E.R.E (EUROPE)

In Association With

EMitech®
ELECTRO MAGNETIC innovative technologies

Kerone Research & Development Centre (KRDC),
B/47, Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

Batch Microwave+Convection Heat Treatment for Drying of Medicinal Powders

ISO 9001-2008 | ISO 9001-2015 | EMS 14001 | OHSAS 18001
In Association with SVCH-Technologii, Moscow (Russia)

Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

Customer :	**Laboratory Experimental Analysis**
Process :	**Batch Microwave+Convection Heat Treatment for Drying of Medicinal Powders**

TEST REPORT No: 47/KRDC/LAB/17 Mum 24/12/2018

Date Sample reception : 24/12/2018
ID : 47/LAB/75

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : Paracetamol-75 kg & Metformin-80 kg
Sampling date : 07/01/2019
Product : Paracetamol Powder & Metformin Powder
Requirement : Final product must have moisture content less than or equal to 0.5%
Start Date test : 07/01/2019
End Date test : 08/01/2019

LABORATORY EXPERIMENTAL SET UP:

Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

LAB BATCH MICROWAVE+CONVECTION HEATING SYSTEM SPECIFICATIONS:

Microwave Power	2 kW(CW)
Frequency	2450 MHz ± 50
Convective Power	3.5 kW (air flow 350 l/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	1HP
Tray Size	450x950x50 mm

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (degree C)	28.1°C (±5°C)
Humidity (%)	≤63% 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

Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

EQUIPMENTS USED:

Name of Equipment	Picture of Equipment	Specifications
Infrared Thermometer		**Model: FLUKE 566** **Temperature Range: -40°C to 650°C** **Display Resolution: 0.1°**
Digital Contact Thermometer		**Model No: TM-902C** **Temperature range: -50~750°C** **Temperature accuracy: ±1°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: ±°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**

SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on Paracetamol powder and Metformin powder separately without adding any additive to speed up the drying rate. For this experimental run, particular quantity of

Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

sample has been taken in microwave transparent tray with uniform thickness and this powder loaded tray has been placed in heating system with different setting parameters. The observations are made on the basis of LOD and moisture content.

ANALYTICAL RESULTS:

1. **Paracetamol:**

Initial Moisture Content: 5.6%

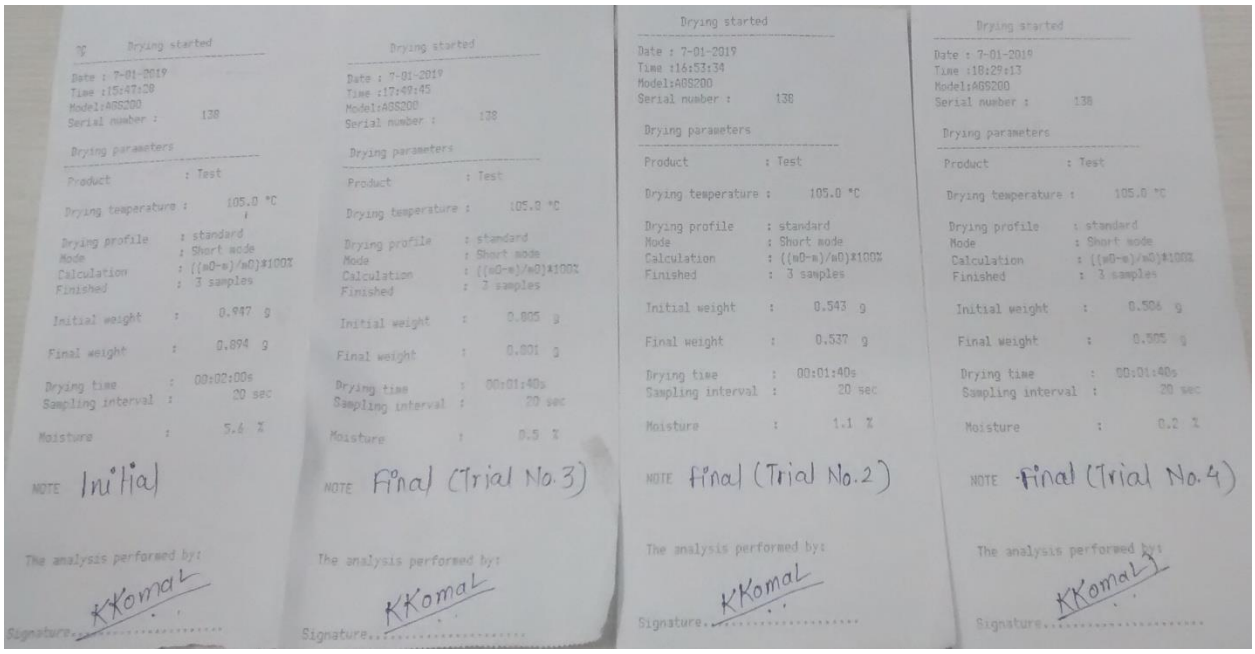
	Trail No. 1		Trial No.2	Trial No.3	Trial No. 4	
	Initial 15 minutes	Next 15 minutes			Initial 15 minutes	Next 15 minutes
Microwave Power (kW)	1	1.5	2	2	2	2
Setting Temperature (°C)	80	80	110	140	140	140
Cake Thickness (mm)	10	10	20	15	15	15
Cycle Time (minutes)	15	(15+)15	15	20	15	(15+)15
Initial Weight (grams)	350	340	398	602	532	498
Final Weight (grams)	340	338	380	562	498	489
Temp. on Product after treatment (°C)	42-45	50-55	55-58	60-65	60-65	70-80
Final Moisture content (%)	3.6	0.47	1.1	0.5	2.1	0.2

2. **Metformin:**
   Initial Weight: 570 grams
   Initial Moisture Content: 0.8%
   Microwave Power: 2 kW
   Setting Temperature: 140°C
   Cycle Time: 5 minutes
   Final Weight: 549 grams
   Final Moisture Content: 0%

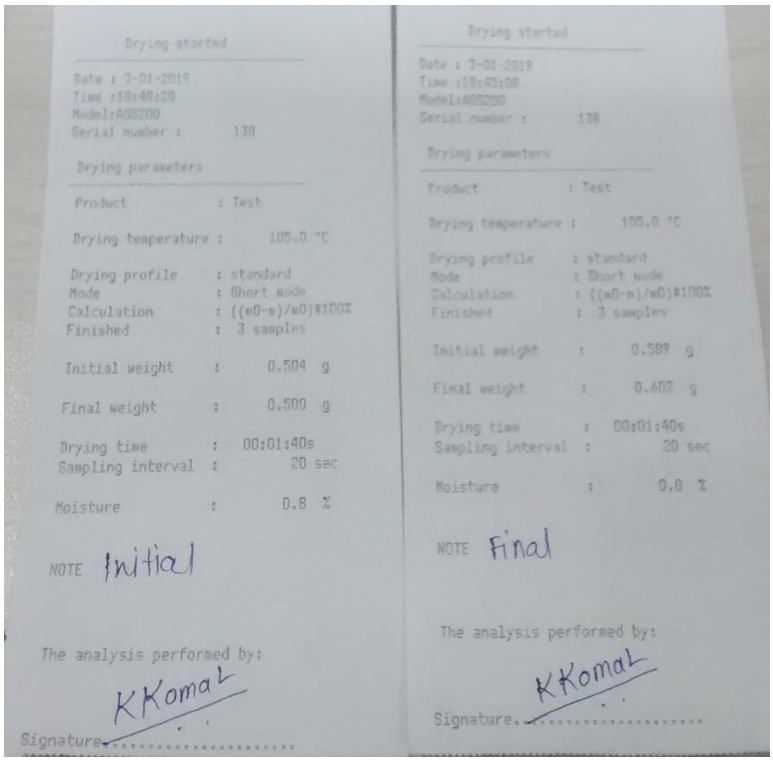
Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

MOISTURE ANALYSIS REPORTS:

1. **Pracetamol:**



2. **Metformin:**



Kerone Research & Development Centre (KRDC)
B/47,Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
Tel- +91-251-2620542/43/44/45/46, Email-info@kerone.com, www.kerone.com

OBSRVATIONS:

The Drying behavior of Paracetamol powder and Metformin powder has been investigated under the microwave+convection heating 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 complete drying with required moisture content without colour change.

K Komal

Miss Komal Bhoite
Tested By