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HEAT TREATMENT FOR DRYING OF DOG CHEW

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

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IN ASSOCIATION WITH EMitech, ITALY

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Customer :	**ASHVIANA**
Process :	**Heat Treatment for Drying of Dog chew**

TEST REPORT No: 57/KRDC/LAB/17 Mum 15/03/2022

Date Sample reception : 28/02/2022
ID : 57/LAB/15

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Sampling date : 28/02/2022
Product : Dog chew
Requirement : Removal of moisture content till the desired hardness is achieved
Start Date test : 28/02/2022
End Date test : 15/03/2022

LABORATORY EXPERIMENTAL SET UP:

LAB BATCH MICROWAVE+CONVECTION HEATING SYSTEM

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LAB BATCH MICROWAVE+CONVECTION SYSTEM SPECIFICATIONS:

Microwave Power	2 KW (CW)
Frequency	2450 MHz ± 50
Convective Power	3.5 KW (airflow 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	1 HP
Tray size (width*height*depth)	450*950*50 mm

LAB BATCH CONVECTION HEATING SYSTEM

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LAB BATCH CONVECTION HEATING SYSTEM SPECIFICATIONS:

Heating Zone (width*height*depth)	510*480*410 mm
No. of Heaters	6
Total Heater Power	6 kW
Motor	0.5 HP
No. of trays	6
Tray size (width*height*depth)	560 x 435 x25
Centrifugal Exhaust Blower	1440 rpm

LAB VACCUM HEATING SYSTEM

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LAB VACCUM HEATING 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	560W, 220V/50Hz, 2880rpm
Free Air Displacement	10.7 CFM
Vacuum Pump (LxWxH)	430x200x300

LAB BATCH CONVECTION + DEHUMIDIFIER HEATING SYSTEM

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LAB BATCH CONVECTION + DEHUMIDIFIER HEATING SYSTEM SPECIFICATIONS:

Heating Zone (width*height*depth)	550*650*550 mm
No. of Heaters	4
Total Heater Power	3 kW
Motor	0.5 HP
No. of trays	7
Tray size (width*height*depth)	600500 X 35
Nominal Capacity of Dehumidifier	1 tr each
Humidity Range of Dehumidifier	20-90%
Max. Ambient Temperature of Dehumidifier	40°C
Water Removal Rate of Dehumidifier	80 lt per day at NTP

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (°C)	30°C (±5°C)
Humidity (%)	≤74% 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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EQUIPMENTS USED:

Name of Equipment	Picture of Equipment	Specifications
Compact Thermal Imaging Camera		Model: FLIR E-30 Resolution: 160 x 120 IR Thermal sensitivity of 0.10°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 Dog chew to speed up the drying rate. For this experimental run, given sample has been placed on different heating system with suitable parameters. Observations are made after decided time period on the basis of weight of the product, moisture content and appearance.

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ANALYTICAL RESULTS: BATCH MICROWAVE+CONVECTION HEATING SYSTEM

Trail 1:

Product A
Product specification: Make-20th feb; cut-22nd feb
Initial moisture: 44.4%
Initial weight: 30g

No. of cycle	Cycle time (min)	Microwave Power (kW)	Microwave Temp (˚C)	Heater Temp (˚C)	Remark, if any
1	After 30 min.	0.2	25	25	charred from core

Total cycle time:30 min.
No. of cycle: 1
Final weight:20g

Trail 2:

product A
Product specification: Make-20th feb; cut-22nd feb
Initial moisture: 44.4%
Initial weight: 40g

No. of cycle	Cycle time (min)	Microwave Power (kW)	Microwave Temp (˚C)	Heater Temp (˚C)	Remark, if any
1	After 10 min.	0.3	25	25	Started drying
2	After 10 min.	0.3	25	25	Patches of charring

Total cycle time:20 min.
No. of cycle: 2
Final weight:28g

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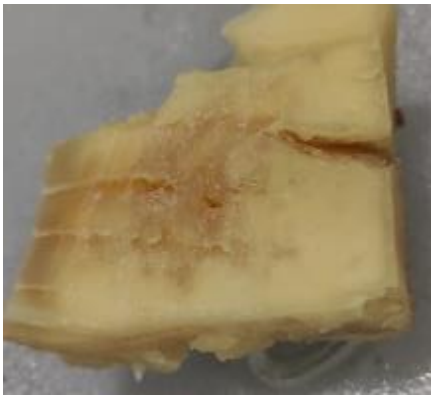
Trail 3:
product D
Product specification: Make-8th feb; cut-13th feb
Initial moisture: 6.8%
Initial weight: 80g

No. of cycle	Cycle time (min)	Microwave Power (kW)	Microwave Temp (˚C)	Heater Temp (˚C)	Remark, if any
1	After 30 min.	0.3	25	25	Totally charred with puffing

Total cycle time:30 min.
No. of cycle: 1
Final weight:70g

BEFORE AND AFTER PICTURES OF TREATED SPCIMEN SAMPLE:

Trial 1



a) Untreated

b) Treated

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Trial 2

a) Untreated **b) Treated**

Trial 3

a) Untreated **b) Treated**

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ANALYTICAL RESULTS: BATCH CONVECTION HEATING SYSTEM

Trail 4:
product A
Product specification: Make-20th feb; cut-22nd feb
Initial moisture: 44.4%
Initial weight: 34g

No. of cycle	Cycle time (hr.)	heater temp. (˚C)	Remark, if any
1	After 4 hr.	30	Drying
2	After 8 hr.	30	Drying, bulging

Total cycle time: 8hr.
No. of cycle: 4 (2hr/cycle)
Final moisture: 32.1%
Final weight:28g

Trail 5:
product B
Product specification: Make-14th feb; cut-20th feb
Initial moisture: 40%
Initial weight: 70g

No. of cycle	Cycle time (hr.)	heater temp. (˚C)	Remark, if any
1	After 4 hr.	30	Drying
2	After 8 hr.	30	Drying, bulging

Total cycle time: 8hr.
No. of cycle: 4 (2hr/cycle)
Final moisture: 25.8%
Final weight:65g

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BEFORE AND AFTER PICTURES OF TREATED SPCIMEN SAMPLE:

Trial 4

a) Untreated

b) Treated

Trial 5

a) Untreated

b) Treated

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ANALYTICAL RESULTS: VACCUM HEATING SYSTEM

Trail 6:
product A
Product specification- Make: 20th feb; cut-22nd feb
Initial moisture: 44.4%
Initial weight: 85g

No. of cycle	Cycle time (hr.)	Heater temp. (˚C)	Heater switch	Remark, if any
1	10	25	1	Drying
2	10	25	1	Hardness not achieved

Total cycle time: 20hr.
No. of cycle: 5(4hr/cycle)
Final weight:80g

Trail 7:
product B
Product specification: Make-14th feb; cut-20th feb
Initial moisture: 40%
Initial weight: 68g

No. of cycle	Cycle time (hr.)	Heater temp. (˚C)	Heater switch	Remark, if any
1	10	25	1	Drying
2	10	25	1	Hardness not achieved

Total cycle time: 20hr.
No. of cycle:5(4hr/cycle)
Final weight:62g

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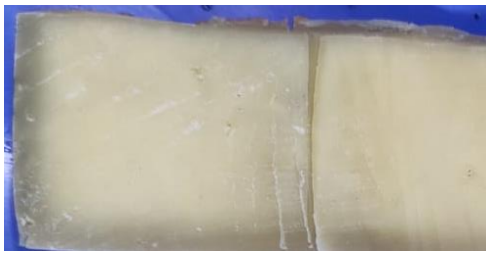
BEFORE AND AFTER PICTURES OF TREATED SPCIMEN SAMPLE:

Trial 6



a) Untreated

b) Treated

Trial 7

a) Untreated

b) Treated

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ANALYTICAL RESULTS: BATCH CONVECTION + DEHUMIDIFIER HEATING SYSTEM

Trail 8:
product A
Product specification: Make-20th feb; cut-22nd feb
Initial weight: 80g

Sr. No.	Cycle time (days)	Heater temp. (˚C)	Relative Humidity (%)	Remark, if any
1	8 days	30	25	Hardened , forming desired curve

Total cycle time: 8 days
Final weight:67g

Trail 9:
product B
Product specification: Make-14th feb; cut-20th feb
Initial weight: 62g

Sr. No.	Cycle time (days)	Heater temp. (˚C)	Relative Humidity (%)	Remark, if any
1	8 days	30	25	Hardened , forming desired curve

Total cycle time: 8 days
Final weight:54g

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Trail 10:
product C
Product specification: Make: 14th feb; cut-17th feb
Initial weight: 91g

Sr. No.	Cycle time (days)	Heater temp. (˚C)	Relative Humidity (%)	Remark, if any
1	8 days	30	25	Hardened , forming desired curve

Total cycle time: 8 days
Final weight:80g

Trail 11:
product D
Product specification: Make-5th feb; cut-10th feb
Initial weight: 117g

Sr. No.	Cycle time (days)	Heater temp. (˚C)	Relative Humidity (%)	Remark, if any
1	8 days	30	25	Hardened

Total cycle time: 8 days
Final weight:104g

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Trail 12:
product E
Product specification: Make-5th feb; cut-23rd feb
Initial weight: 44g

Sr. No.	Cycle time (days)	Heater temp. (˚C)	Relative Humidity (%)	Remark, if any
1	8 days	30	25	Hardened

Total cycle time: 8 days
Final weight:37g

BEFORE AND AFTER PICTURES OF TREATED SPCIMEN SAMPLE:

Trial 8

a) Untreated

b) Treated

Trial 9

a) Untreated

b) Treated

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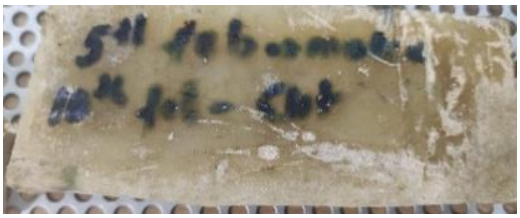
Trial 10

a) Untreated

b) Treated

Trial 11



a) Untreated

b) Treated

Trial 12

a) Untreated

b) Treated

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OBSERVATION:

The drying behavior of Dog Chew has been investigated under the Microwave + Convection heating system, Batch Convection heating system, Vacuum heating system, batch convection + dehumidifier heating system. The drying rate is found to be increasing with respect to increase in time. It has been found that the product's weight is slightly affected. As per physical investigation, it has been observed that there is no degradation of product except in Microwave system. Also the hardness and desired curve forming was only observed in batch convection + Dehumidifier heating system.

Ms. Sayali Asole
(Tested By)