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Kerone Research & Development Centre (KRDC),
B/47, Addl. MIDC. Anand Nagar, Ambernath (East), Thane- 421 506, India
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Drying OF DCP LUMPS & POWDER IN ROTARY IR HEATING SYSTEM

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Customer :	**M/s. NANDA CHEMICALS.**
Process :	**Drying of DCP(Dicalcium Phosphate) in Rotary IR Heating System**

TEST REPORT No: 49/KRDC/LAB/17 Mum 01/12/2021

Date Sample reception : 30/11/2021
ID : 49/LAB/169

SAMPLE DESCRIPTION:

Sampling : As Requested
Sample Condition : Acceptable
Quantity : 1kg of DCP lumps (approx. 20-25mm) & DCP powder.
Sampling date : 30/11/2021
Product : Dicalcium Phosphate.
Requirement : Drying.
Start test Date : 30/11/2021
End test Date : 30/11/2021

LABORATORY EXPERIMENTAL SETUP:

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LAB CONTINUOUS IR HEATING SYSTEM SPECIFICATIONS:

Infrared Power	5 kW
Type of Infrared Emitters	Quartz Infrared
Rotary Drum Size	Φ324 mm x 800 mm long x 3mm Thk.
Thermal Monitoring System	Single Channel Fiber Optic: Range -40 to 250°C
Exhaust	Exhaust port with manual damper
Air Circulation Fan	Radial Fan FHP 0.5HP

ENVIRONMENT-LABORATORY AMBIENT CONDITIONS:

Temperature (degree C)	30°C (±5°C)
Humidity (%)	≤67% 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: 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)

SAMPLE PREPARATION AND METHOD/PROCEDURE:

The experiment has been performed on given sample i.e. DCP lumps and powder for drying treatment. For this experimental run, given sample is passed through continuous rotary IR heating system at various set parameters .Multiple passes/ Single pass is given to achieve desired output. The observations are made on the basis of temperature on product and physical changes in product samples.

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ANALYTICAL RESULTS:

Trial No. 1: Small size of lump range (20-25) mm & DCP Powder.

Initial Weight: 1kg
Initial Moisture of lump: 41.7%
Initial Moisture of powder: 33.6%
IR set temperature: 300°C
Drum RPM: 0.38.

Sr. No.	Cycle Time (minutes)	Product Temp. (°C)	Product Weight	Moisture Content. %	Remarks.
1.	35min.	(47-69) °C	0.661gm	31.3% (DCP Lump) 1.3% (Powder)	1. DCP lump partially dried. 2. DCP powder dried as desired.
2.	70min.	(73-93) °C	0.498gm	2.2% (DCP Lump)	DCP lump dried as desired.

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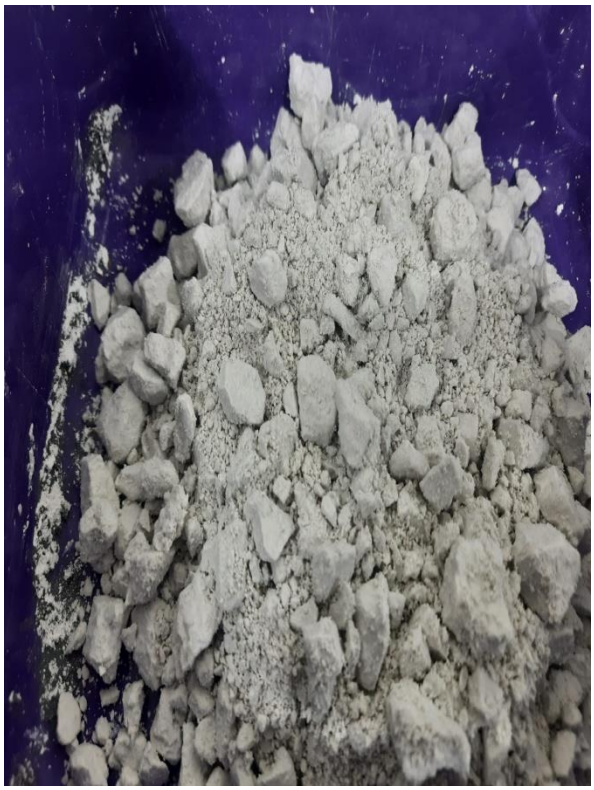
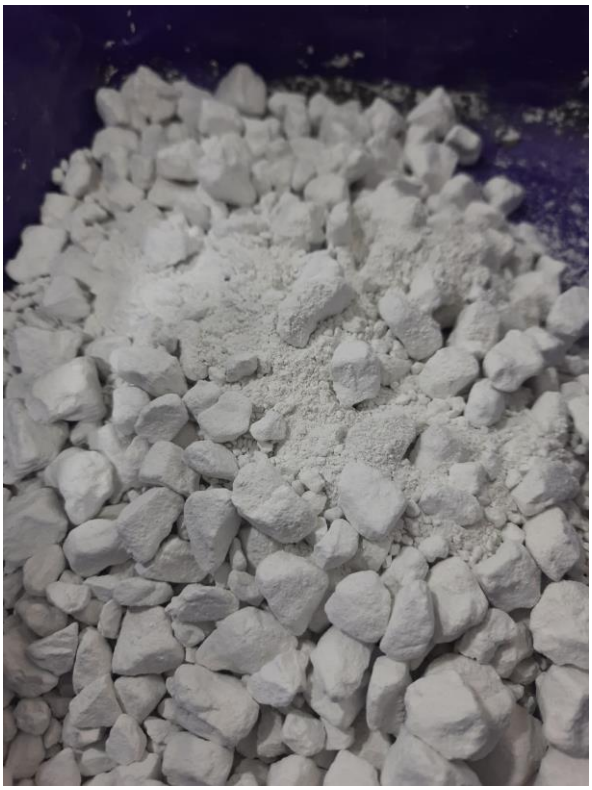
BEFORE AND AFTER PICTURES OF TREATED SPECIMEN SAMPLE:



a) UNTREATED



b) TREATED

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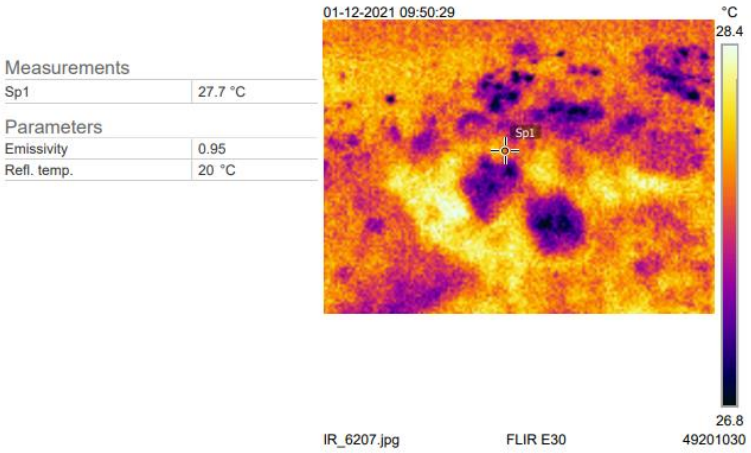
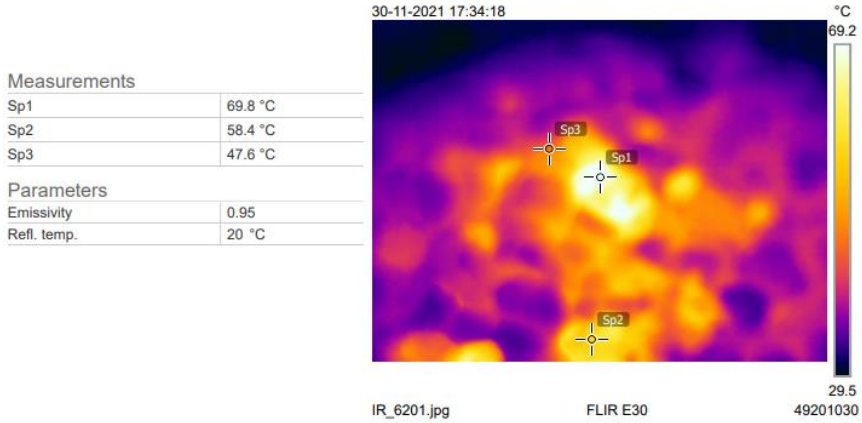
THERMAL IMAGE BEFORE AND AFTER HEAT TREATMENT:

Before Heat Treatment:



AFTER FIRST CYCLE:



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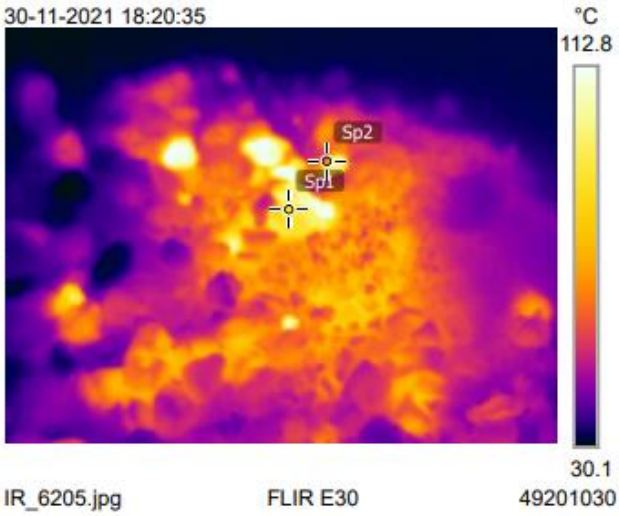
AFTER FINAL CYCLE:

Measurements	
Sp1	92.4 °C
Sp2	73.4 °C
Parameters	
Emissivity	0.95
Refl. temp.	20 °C



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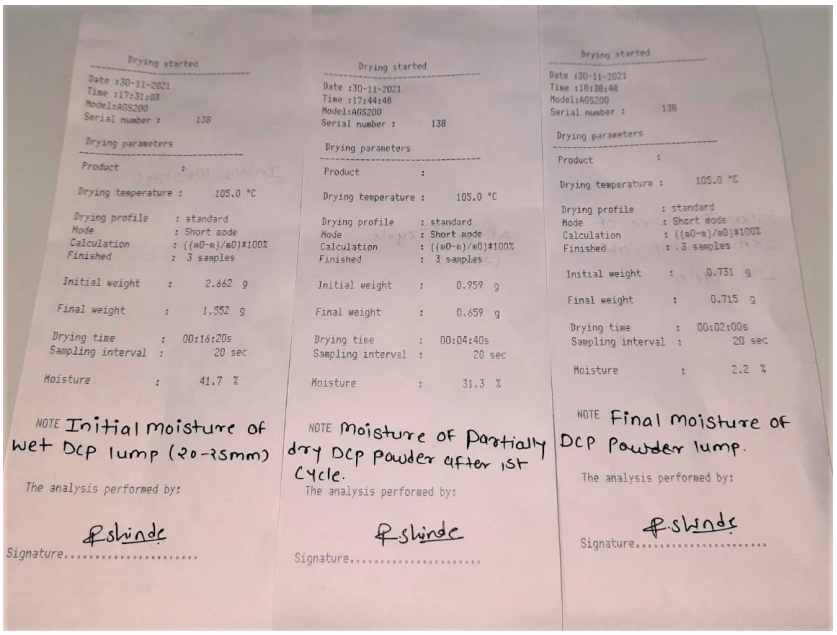
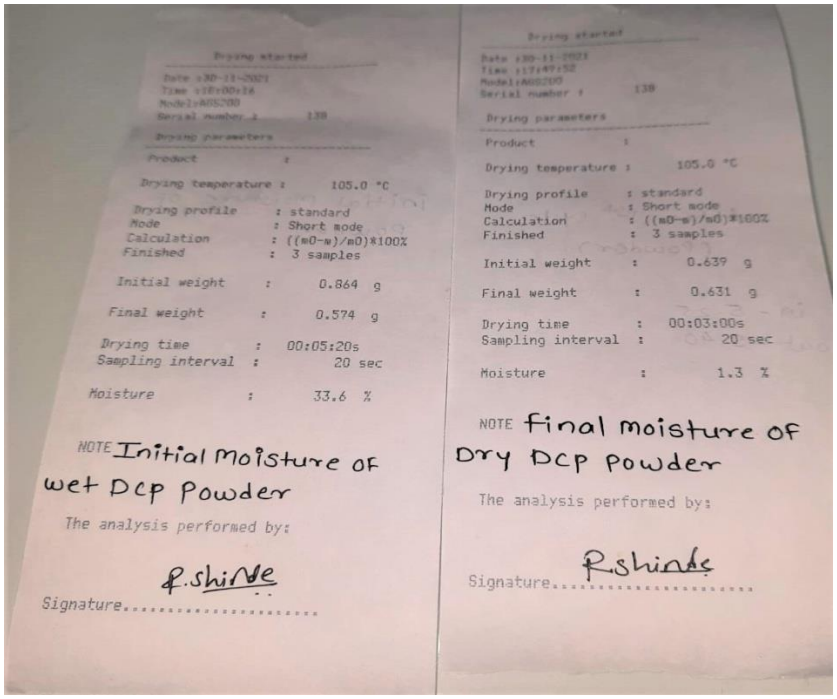
MOISTURE ANALYSIS REPORTS:



Drying started
Date :30-11-2021
Time :17:31:03
Model:AGS200
Serial number : 138
Drying parameters
Product :
Drying temperature : 105.0 °C
Drying profile : standard
Mode : Short mode
Calculation : ((m0-m)/m0)*100%
Finished : 3 samples
Initial weight : 2.662 g
Final weight : 1.552 g
Drying time : 00:16:20s
Sampling interval : 20 sec
Moisture : 41.7 %
NOTE Initial moisture of wet DCP lump (20-25mm)
The analysis performed by:
R.shinde
Signature.....

Drying started
Date :30-11-2021
Time :17:44:48
Model:AGS200
Serial number : 138
Drying parameters
Product :
Drying temperature : 105.0 °C
Drying profile : standard
Mode : Short mode
Calculation : ((m0-m)/m0)*100%
Finished : 3 samples
Initial weight : 0.959 g
Final weight : 0.659 g
Drying time : 00:04:40s
Sampling interval : 20 sec
Moisture : 31.3 %
NOTE Moisture of partially dry DCP powder after 1st cycle.
The analysis performed by:
R.shinde
Signature.....

Drying started
Date :30-11-2021
Time :18:38:48
Model:AGS200
Serial number : 138
Drying parameters
Product :
Drying temperature : 105.0 °C
Drying profile : standard
Mode : Short mode
Calculation : ((m0-m)/m0)*100%
Finished : 3 samples
Initial weight : 0.731 g
Final weight : 0.715 g
Drying time : 00:02:00s
Sampling interval : 20 sec
Moisture : 2.2 %
NOTE Final moisture of DCP Powder lump.
The analysis performed by:
R.shinde
Signature.....



Drying started
Drying parameters
Product :
Drying temperature : 105.0 °C
Drying profile : standard
Mode : Short mode
Calculation : ((m0-m)/m0)*100%
Finished : 3 samples
Initial weight : 0.864 g
Final weight : 0.574 g
Drying time : 00:05:20s
Sampling interval : 20 sec
Moisture : 33.6 %
NOTE Initial moisture of wet DCP Powder
The analysis performed by:
R.shinde
Signature.....

Drying started
Drying parameters
Product :
Drying temperature : 105.0 °C
Drying profile : standard
Mode : Short mode
Calculation : ((m0-m)/m0)*100%
Finished : 3 samples
Initial weight : 0.639 g
Final weight : 0.631 g
Drying time : 00:03:00s
Sampling interval : 20 sec
Moisture : 1.3 %
NOTE final moisture of Dry DCP Powder
The analysis performed by:
R.shinde
Signature.....

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OBSERVATIONS:

The heating behavior of Dicalcium Phosphate has been investigated under the Rotary IR Heating System. The heating rate is found to be increasing with respect to increasing cycle time. Also, it has been found that the colour of Lumps & Powder becomes brighter. Complete product is dried as desired.

Miss. Rucha Shinde

Tested By