

केन्द्रीय पेट्रोकेमिकल अभियांत्रिकी
एवं प्रौद्योगिकी संस्थान (सिपेट)

(पूर्व में सेंट्रल इंस्टिट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एवं टेक्नोलॉजी)
इंस्टिट्यूट ऑफ पेट्रोकेमिकल टेक्नोलॉजी (आई.पी.टी.)

रसायन एवं पेट्रोकेमिकल विभाग

रसायन एवं उर्वरक मंत्रालय, भारत सरकार

एच.आई.एल.कोलनी, एडयार रोड, पथलम

उद्योगमंडल पी.ओ., कोची, केरल - 683 501

फोन : 0484-2547741, 2546740

ई-मेल : kochi@cipet.gov.in, cipetkochi@gmail.com

वेबसाइट : www.cipet.gov.in



CIPET सिपेट
prebe.perform.practise.Plastic

परीक्षण रिपोर्ट
TEST REPORT

CENTRAL INSTITUTE OF PETROCHEMICALS
ENGINEERING & TECHNOLOGY (CIPET)

(Formerly Central Institute of Plastics Engineering & Technology)

INSTITUTE OF PETROCHEMICALS TECHNOLOGY (IPT)

Department of Chemicals & Petrochemicals

Ministry of Chemicals & Fertilizers, Govt. of India

HIL Colony, Edayar Road, Pathalam

Udyogamandal P.O., Kochi, Kerala - 683 501

Ph: 0484-2547741, 2546740

E-mail:kochi@cipet.gov.in, cipetkochi@gmail.com

Web : www.cipet.gov.in

क्र.सं. / Sl. No. 10109

ANALYSIS REPORT

Issued to :

M/s. Leetha Pack Pvt. Ltd.

Muringoor P.O.,

Chalakkudy -680316.

Page 1 of 4

Test Report No : 23111

Date: 18.05.2023

Customer Ref. No. & date : Letter dt 06.12.2022

Work order Ref.No. : 503/22-23

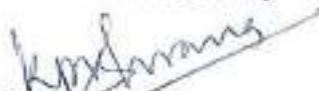
As per Standard: : As per part C

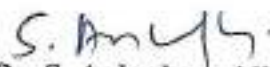
PART A : PARTICULARS OF SAMPLE SUBMITTED

a) Name of the sample	: Paper Boards coated with PC140 water based dispersion as stated by the party
b) Grade / Variety / type / Size / Class etc.	: Nil
c) Code No.	: Nil
d) Quantity (pcs/mtr/gm/nos)	: 2 Kg
e) Mode of Packing (Sealed cartoon/polypouch/container or not)	: Sealed carton
f) Date of receipt of sample	: 06.12.2022
g) Date of Performance of test	: 10.12.2022 - 11.05.2023
h) Any other information	: Interim Report No. 22927 dt. 10.03.2023

PART B: SUPPLEMENTARY INFORMATION

a) Reference to sampling procedure	: Drawn & Supplied by the party
b) Supporting documents for measurements taken and results derived like graphs, tables, sketches and / or Photographs as appropriate to test report, if any (to be attached)	: As per part -C
c) Deviation from the test methods as prescribed in relevant ASTM/ISO/BIS / Work instructions, if any	: ---


Dr. K.P. Bhuvana
Manager (Technical)
Authorized Signatory


Dr. S. Anbudayanidhi
Manager (Technical)
Authorized Signatory

केंद्रीय पेट्रोसायन अभियांत्रिकी
एवं प्रौद्योगिकी संस्थान (सिपेट)

(पूर्व में केंद्र इंस्टिट्यूट ऑफ प्लास्टिक्स इंजिनियरिंग एवं टेक्नॉलॉजी)
इंस्टिट्यूट ऑफ पेट्रोसायन टेक्नॉलॉजी (आई.पी.टी.)

रसायन एवं पेट्रोसायन विभाग

रसायन एवं उर्वरक मंत्रालय, भारत सरकार

एच.आई.एन. कॉलोनी, एडयार रोड, पथलम

उद्योगमंडल पी.ओ., कोची, केरल - 683 501

फोन : 0484-2547741, 2546740

ई-मेल : kochi@cipet.gov.in, cipetkochi@gmail.com

वेबसाइट : www.cipet.gov.in



CIPET सिपेट
probe, perform, practice, Plastics

परीक्षण रिपोर्ट
TEST REPORT

CENTRAL INSTITUTE OF PETROCHEMICALS
ENGINEERING & TECHNOLOGY (CIPET)

(Formerly Central Institute of Plastics Engineering & Technology)

INSTITUTE OF PETROCHEMICALS TECHNOLOGY (IPT)

Department of Chemicals & Petrochemicals

Ministry of Chemicals & Fertilizers, Govt. of India

HIL Colony, Edayar Road, Pathalam

Udyogamandal P.O., Kochi, Kerala - 683 501

Ph: 0484-2547741, 2546740

E-mail: kochi@cipet.gov.in, cipetkochi@gmail.com

Web : www.cipet.gov.in

क्र.सं. / SI. No. 10109

ANALYSIS REPORT

Page 2 of 4


PART C: TEST RESULTS

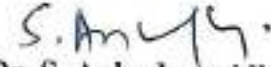
Report No.: 23111

Date: 18.05.2023

Sl. No	Name of the test	Test Method/ Standard	Unit	Results Obtained	Specified Requirement
Sample details: Paper Boards coated with PC140 water based dispersion as stated by the party					
1.	Material Identification	FTIR/DSC	--	Base Material: Paper (Cellulose) Coating: Acrylic based dispersion coating	--
2.	Disintegration (Dry mass remains in 2mm sieve after 84 days)	Cl. 6.2 of ISO 17088-2021 / ASTM D 6868	%	5.21	Not more than 10% of its original dry mass
3.	Ultimate aerobic biodegradation (with reference to 100% degradation of positive reference)	Cl. 6.3.1 of ISO 17088-2021 ISO:14855-1 / ASTM D 6868	%	90.93 (At the end of 91 days)	> 90% (At the end of the test period not more than 180 days)
4.	Plant Growth study Monocotyledon(Paddy) % Seed emergence Dicotyledon(Tomato) % Seed emergence	Cl. 6.4.3 of ISO 17088:2021 (Annex C)	% %	94 92	> 90% of those from the corresponding blank compost

Note: The detailed observation on biodegradability test is enclosed as Annexure. I


Dr. K. P. Bhuvana
Manager (Technical)
Authorized Signatory


Dr. S. Anubudayanidhi
Manager (Technical)
Authorized Signatory



Continuation Sheet

ANALYSIS REPORT

Page 3 of 4

PART C: TEST RESULTS

Report No.: 23111

Date: 18.05.2023

Sl No	Name of the test	Test Method/ Standard	Unit	Results Obtained	Specified Requirement
5.	Acute Ecotoxic Effects to earthworm				
a.	Survival of adult earthworm at the end of 7 days	Cl. 6.4.4 of ISO 17088:2021 (Annex D)	% ³	100	> 90% of those from the corresponding blank compost
b.	Survival of adult earthworm at the end of 14 days		%	100	
c.	Biomass at the end of 14 days		%	93.21	
6	Chronic Ecotoxic Effects to earthworm				
a.	Survival of adults earthworm at the end of 28 days	Cl. 6.4.5 of ISO 17088:2021 (Annex E)	%	100	> 90% of those from the corresponding blank compost
b.	Survival of adults earthworm at the end of 56 days		%	100	
c.	Offspring at the end of 56 days		%	93	
d.	Biomass at the end of 56 days		%	93.56	

K. P. Bhuvana

Dr. K. P. Bhuvana
Manager (Technical)
Authorized Signatory

S. Anbudayanidhi

Dr. S. Anbudayanidhi
Manager (Technical)
Authorized Signatory

Continuation Sheet

ANALYSIS REPORT

Page 4 of 4

PART C: TEST RESULTS


Report No.: 23111
Date: 18.05.2023

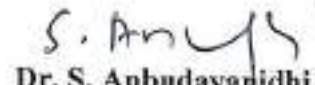
Sl. No.	Property	Test method / Standard	Unit	Results obtained	Specified Requirements (Max.)
7.	<u>Heavy Metal Analysis</u> (on dry mass basis) Arsenic (As) Copper (Cu) Nickel (Ni) Zinc (Zn) Chromium (Cr) Mercury (Hg) Cadmium(Cd) Lead (Pb)	Cl. 6.5.2 of ISO 17088:2021/Cl.4.3 of IS 17899 T:2022	mg / kg	0.0450 0.6412 1.8818 0.5316 0.7039 0.0045 0.2388 1.6630	10 300 50 1000 50 0.15 5 100

PART D: REMARKS: NIL

Note

1. This Test Report / Certificate is issued only for the samples submitted to the laboratory.
2. The results stated above related only to the items tested.
3. The quality of the subsequent production lot has to be ensured by the purchaser.
4. This Test Report shall not be reproduced except in full without the written approval of the laboratory.
5. Any anomaly/discrepancy in this report should be brought to the notice of the laboratory within 30 days from the date of issue.
6. Subcontracted Tests (if any):S.No.1


Dr. K. P. Bhuvana
Manager (Technical)
Authorized Signatory


Dr. S. Anbudayanidhi
Manager (Technical)
Authorized Signatory

केंद्रीय पेट्रोकेमिकल्स इंजीनियरिंग

एवं तकनीकी संस्थान (सिपेट)

(पूर्व में केंद्र एडियार रोड पथालम इंजीनियरिंग एण्ड टेक्नोलॉजी)

इंस्टिट्यूट ऑफ पेट्रोकेमिकल्स टेक्नोलॉजी (आई.पी.टी.)

रसायन एवं पेट्रोलियम विभाग

रसायन एवं उर्वरक मंत्रालय, भारत सरकार

एन. आई. एल. कॉलोनी, एडियार रोड, पथालम

उद्योगमंडल पो.ओ. कोची, केरल - 683 501

फोन : 0484-2547741, 2548740

ई-मेल: kochi@cipet.gov.in, cipetkochi@gmail.com

वेबसाइट : www.cipet.gov.in



Continuation Sheet

CENTRAL INSTITUTE OF PETROCHEMICALS
ENGINEERING & TECHNOLOGY (CIPET)

(Formerly Central Institute of Plastics Engineering & Technology)

INSTITUTE OF PETROCHEMICALS TECHNOLOGY (IPT)

Department of Chemicals & Petrochemicals

Ministry of Chemicals & Fertilizers, Govt. of India

HIL Colony, Edayar Road, Pathalam

Udyogamandal P.O., Kochi, Kerala-683 501

Ph: 0484-2546740

E-mail:kochi@cipet.gov.in, cipetkochi@gmail.com

Web : www.cipet.gov.in

ANNEXURE-I

Page 1 of 7

TR. NO.: 23111

ANALYSIS RESULT

Date: 18.05.2023

OBSERVATION FOR BIODEGRADABILITY TEST AS PER ISO 17088:2021

Name of the Customer :

M/s. Leetha Pack Pvt. Ltd.

Muringoor P.O.,

Chalakkudy -680316.

1. Sample Details: Paper Boards coated with PC140 water based dispersion as stated by the party

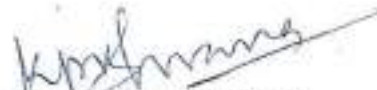
2. Material Identification by FTIR & DSC: Base Material: Paper (Cellulose)

Coating: Acrylic based dispersion coating

3. Observations:

a. Conditions of reaction Mixture

Origin of Compost	: Livestock excrement, municipal and vegetable waste
Reaction Temperature	: 58°C (±2°C)
Dry Solid (%)	: 53.68 %
Volatile content (%)	: 34.49%
CO ₂ evolved during 1 st 10 days in blank vessels	: 52.48 mg/g of volatile solids of compost
Test Duration (Days)	: 91 Days
Reference material	: Cellulose
Volume of reaction Vessel	: 3000ml


DR. K. P. BHUVANA
MANAGER (TECHNICAL)
AUTHORIZED SIGNATORY


DR. S. ANBUDAYANIDHI
MANAGER (TECHNICAL)
AUTHORIZED SIGNATORY

केंद्रीय पेट्रोकेमिकल्स इंजीनियरिंग

एवं तकनीकी संस्थान (सिपेट)

(पूर्व में केंद्रित इंस्टिट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एंड टेक्नॉलॉजी)

इंस्टिट्यूट ऑफ पेट्रोकेमिकल्स टेक्नॉलॉजी (आई.पी.टी.)

रसायन एवं पेट्रोरसायन विभाग

रसायन एवं उर्वरक मंत्रालय, भारत सरकार

एच. आई. एल. कॉलोनी, एडयार रोड, पथालम

उद्योगमंडल पो.ओ. कोची, केरल - 683 501

फोन : 0484-2547741, 2546740

ई-मेल: kochi@cipet.gov.in, cipetkochi@gmail.com

वेबसाइट : www.cipet.gov.in



Continuation Sheet

CENTRAL INSTITUTE OF PETROCHEMICALS
ENGINEERING & TECHNOLOGY (CIPET)

(Formerly Central Institute of Plastics Engineering & Technology)

INSTITUTE OF PETROCHEMICALS TECHNOLOGY (IPT)

Department of Chemicals & Petrochemicals

Ministry of Chemicals & Fertilizers, Govt. of India

HIL Colony, Edayar Road, Pathalam

Udyogamandal P.O., Kochi, Kerala-683 501

Ph: 0484-2546740

E-mail:kochi@cipet.gov.in, cipetkochi@gmail.com

Web : www.cipet.gov.in

Page 2 of 7

TR. NO.: 23111

ANALYSIS RESULT

Date: 18.05.2023

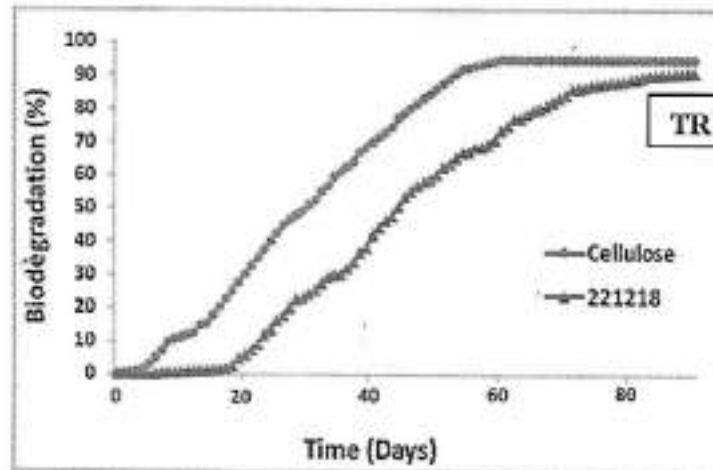
b. pH of test medium

Sl No	Composting Vessel (Material with test medium)	pH (Before)	pH (After)
1	Sample 1	7.5	7.2
2	Sample 2	7.5	7.2
3	Sample 3	7.5	7.2
4	Blank	7.5	7.1
5	Positive 1	7.5	7.3
6	Positive 2	7.5	7.3
7	Positive 3	7.5	7.1
8	Negative	7.5	7.2

4. Result: Percentage biodegradation relative to positive reference

Mean(%) : 90.93%

The reference material- cellulose(%) : -100%



K. P. Bhuvana
DR. K. P. BHUVANA
MANAGER (TECHNICAL)
AUTHORIZED SIGNATORY

C. Anbudayanidhi
DR. S. ANBUDAYANIDHI
MANAGER (TECHNICAL)
AUTHORIZED SIGNATORY

केंद्रीय पेट्रोकेमिकल्स इंजीनियरिंग

एवं तकनीकी संस्थान (सिपेट)

(पूर्व में केंद्र, इंडियन इंस्टीट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एंड टेक्नोलॉजी)

इंस्टीट्यूट ऑफ पेट्रोकेमिकल्स टेक्नोलॉजी (आई.पी.टी.)

रसायन एवं पेट्रोरसायन विभाग

रसायन एवं उर्वरक भंडारण, भारत सरकार

एच. आई.एल. कॉलोनी, एडयार रोड, पथालम

उद्योगमंडल पी.ओ. कोची, केरल - 683 501

फोन : 0484-2547741, 2548740

ई-मेल: kochi@cipet.gov.in, cipetkochi@gmail.com

वेबसाइट : www.cipet.gov.in



Continuation Sheet

CENTRAL INSTITUTE OF PETROCHEMICALS
ENGINEERING & TECHNOLOGY (CIPET)

(Formerly Central Institute of Plastics Engineering & Technology)

INSTITUTE OF PETROCHEMICALS TECHNOLOGY (IPT)

Department of Chemicals & Petrochemicals

Ministry of Chemicals & Fertilizers, Govt. of India

HIL Colony, Edayar Road, Pathalam

Udyogamandal P.O., Kochi, Kerala-683 501

Ph: 0484-2546740

E-mail:kochi@cipet.gov.in, cipetkochi@gmail.com

Web : www.cipet.gov.in

Page 3 of 7

TR. NO.: 23111

ANALYSIS RESULT

Date: 18.05.2023

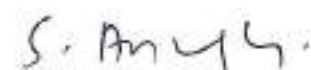
5. Visual observation of Sample

Description	Week 1	Week 4	Week 7	Week 10	Week 13
Structure	Cut Pieces of paper board Sample	Cut Pieces of paper board Sample	Disintegrated pieces of paper board Sample	Disintegrated pieces of paper board Sample	--
Moisture	Adequate moisture level	Adequate moisture level	Adequate moisture level	Adequate moisture level	Adequate moisture level
Colour	Off-white	Faded White	Faded White	Faded White	--
Fungal Development	Nil	Nil	Nil	Nil	Nil
Smell	Organic/ Dirt Like	Organic/ Dirt Like	Organic/ Dirt Like	Organic/ Dirt Like	Organic/ Dirt Like

6. Visual observation of compost

Description	Week 1	Week 4	Week 7	Week 10	Week 13
Structure	Fine Particles	Fine Particles	Fine Particles	Fine Particles	Fine Particles
Moisture	Adequate moisture level	Adequate moisture level	Adequate moisture level	Adequate moisture level	Adequate moisture level
Colour	Dark Brown	Dark Brown	Dark Brown	Dark Brown	Dark Brown
Fungal Development	Nil	Nil	Nil	Nil	Nil
Smell	Organic/ Dirt Like	Organic/ Dirt Like	Organic/ Dirt Like	Organic/ Dirt Like	Organic/ Dirt Like


DR. K. P. BHUVANA
MANAGER (TECHNICAL)
AUTHORIZED SIGNATORY


DR. S. ANBUDAYANIDHI
MANAGER (TECHNICAL)
AUTHORIZED SIGNATORY



CIPET सिपेट

www.cipet.gov.in

Continuation Sheet

TR. NO.: 23111

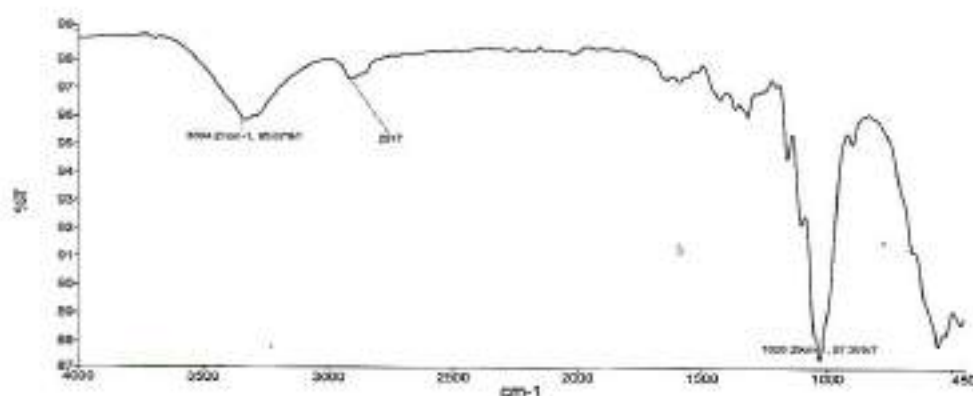
ANALYSIS RESULT

Date: 18.05.2023

Sample Details: Paper Boards coated with PC140 water based dispersion as stated by the party

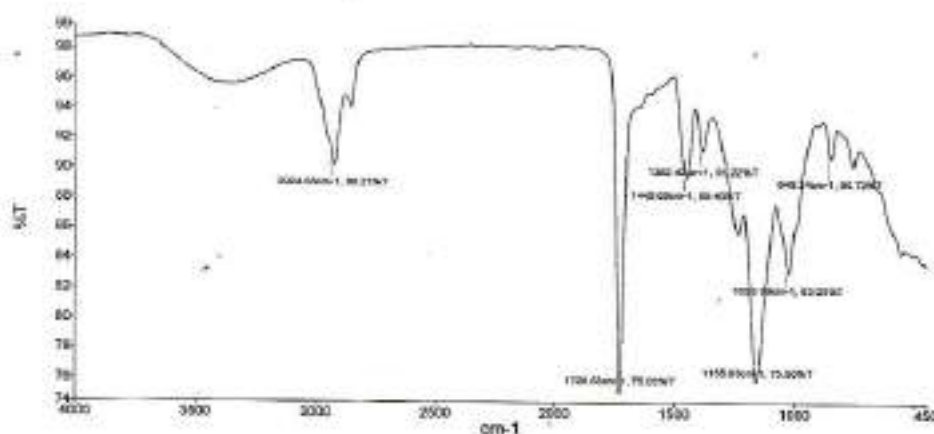
7. FTIR Analysis

FTIR Spectrum of outer layer



Wave number(cm ⁻¹)	Nature of Bond
3334.21	O-H stretching vibration
2917	C-H stretching vibration
1028.29	C-O stretching vibration

FTIR Spectrum of coating



Wave number(cm ⁻¹)	Nature of Bond
2924.68	C-H stretching vibration
1726.83	C=O stretching vibration
1449.69	C-H bending vibration
1155.83	C-O stretching vibration

K. P. Bhuvana
DR. K. P. BHUVANA
MANAGER (TECHNICAL)
AUTHORIZED SIGNATORY

S. Anbudayanidhi
DR. S. ANBUDAYANIDHI
MANAGER (TECHNICAL)
AUTHORIZED SIGNATORY

केन्द्रीय पेट्रोकेमिकल्स इंजीनियरिंग

एवं तकनीकी संस्थान (सिपेट)

(पूर्व में संयुक्त इंजीनियरिंग और प्लास्टिक्स इंजीनियरिंग एंड टेक्नोलॉजी)

इंस्टिट्यूट ऑफ पेट्रोकेमिकल्स टेक्नोलॉजी (आई.पी.टी.)

रसायन एवं पेट्रोरसायन विभाग

रसायन एवं उर्वरक मंत्रालय, भारत सरकार

एच. आई.एल. कॉलोनी, एडयार रोड, पथालम

उद्योगमंडल पी.ओ. कोची, केरल - 683 501

फोन : 0484-2547741, 2546740

ई-मेल: kochi@cipet.gov.in, cipetkochi@gmail.com

वेबसाइट : www.cipet.gov.in



CIPET सिपेट
petro petro plastic Petro

Continuation Sheet

CENTRAL INSTITUTE OF PETROCHEMICALS
ENGINEERING & TECHNOLOGY (CIPET)

(Formerly Central Institute of Plastics Engineering & Technology)

INSTITUTE OF PETROCHEMICALS TECHNOLOGY (IPT)

Department of Chemicals & Petrochemicals

Ministry of Chemicals & Fertilizers, Govt. of India

HIL Colony, Edayar Road, Pathalam

Udyogamandal P.O., Kochi, Kerala-683 501

Ph: 0484-2546740

E-mail:kochi@cipet.gov.in, cipetkochi@gmail.com

Web : www.cipet.gov.in

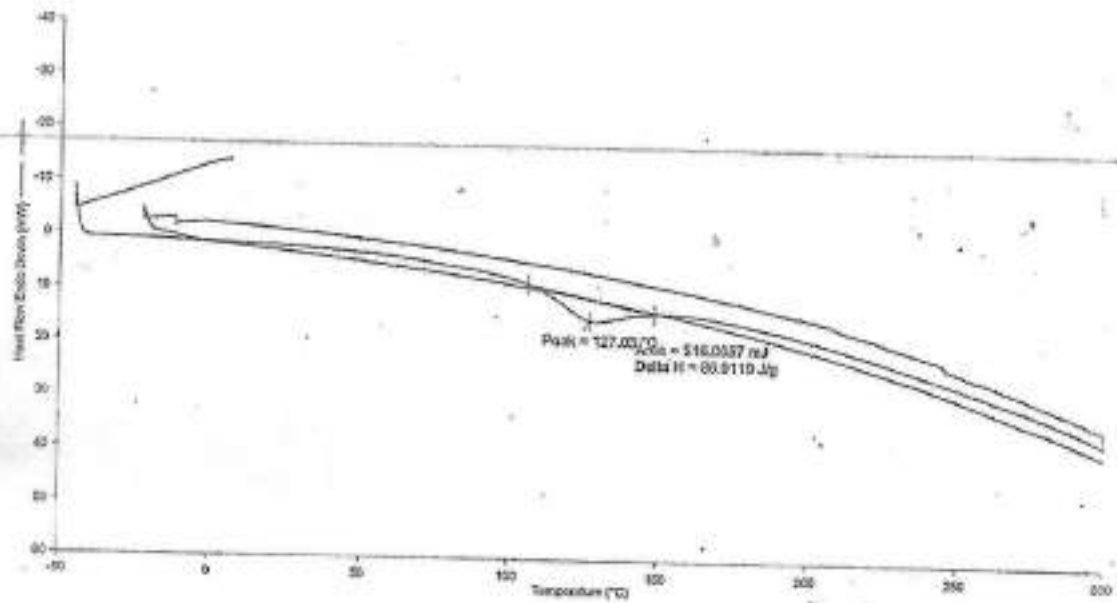
Page 5 of 7

TR. NO.: 23111

ANALYSIS RESULT

Date: 18.05.2023

8. DSC Analysis



Comment: The above DSC & FTIR analysis indicates the above sample is Cellulose coated with Acrylic based dispersion coating


DR. K. P. BHUVANA
MANAGER (TECHNICAL)
AUTHORIZED SIGNATORY


DR. S. ANBUDAYANIDHI
MANAGER (TECHNICAL)
AUTHORIZED SIGNATORY

केंद्रीय पेट्रोकेमिकल्स इंजीनियरिंग

एवं तकनीकी संस्थान (सिपेट)

(पूर्व में संयुक्त इंस्टिट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एण्ड टेक्नोलॉजी)

इंस्टिट्यूट ऑफ पेट्रोकेमिकल्स टेक्नोलॉजी (आई.पी.टी.)

रसायन एवं पेट्रोसायन विभाग

रसायन एवं उर्वरक मंत्रालय, भारत सरकार

एच. आई. एल. कॉलोनी, एडयार रोड, पथलम

उद्योगमंडल पी.ओ. कोची, केरल - 683 501

फोन : 0484-2547741, 2546740

ई-मेल: kochi@cipet.gov.in, cipetkochi@gmail.com

वेबसाइट : www.cipet.gov.in



CIPET सिपेट
petro chemical plastic

Continuation Sheet

CENTRAL INSTITUTE OF PETROCHEMICALS
ENGINEERING & TECHNOLOGY (CIPET)

(Formerly Central Institute of Plastics Engineering & Technology)

INSTITUTE OF PETROCHEMICALS TECHNOLOGY (IPT)

Department of Chemicals & Petrochemicals

Ministry of Chemicals & Fertilizers, Govt. of India

HIL Colony, Edayar Road, Pathalam

Udyogamandal P.O., Kochi, Kerala-683 501

Ph: 0484-2546740

E-mail:kochi@cipet.gov.in, cipetkochi@gmail.com

Web : www.cipet.gov.in

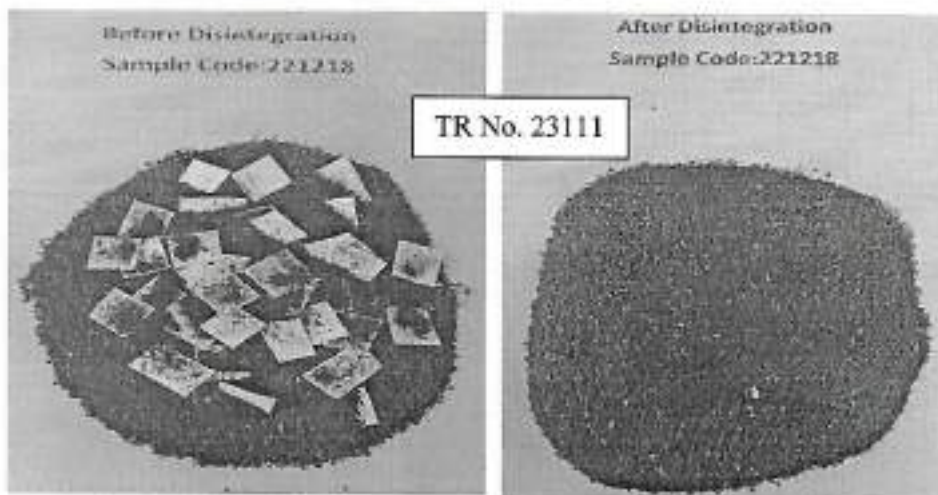
Page 6 of 7

TR. NO.: 23111

ANALYSIS RESULT

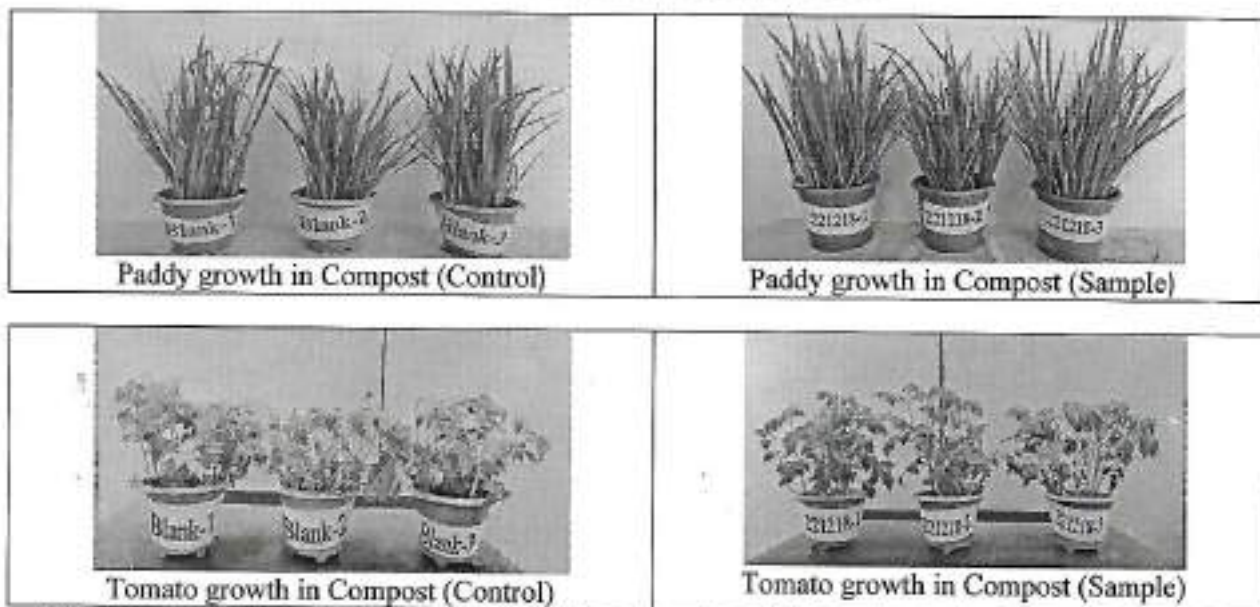
Date: 18.05.2023

9. DISINTEGRATION- AFTER 12 WEEKS




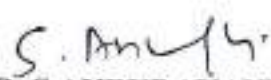
The disintegration of the supplied sample by passing through 2-mm sieve after 12 week in composting condition as per ISO 17088-2021 was found not more than 10% of original dry mass remain.

10. SEED GERMINATION AND PLANT GROWTH STUDY

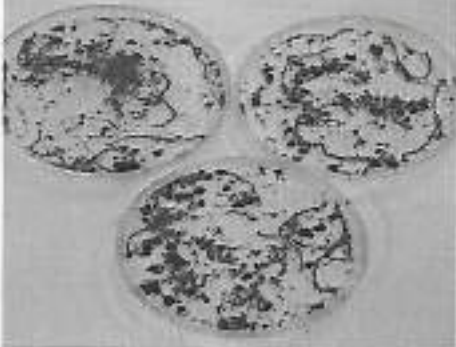






The percentage of seed germination was found to be greater than 90% for both control and sample.


DR. K. P. BHUVANA
MANAGER (TECHNICAL)
AUTHORIZED SIGNATORY


DR. S. ANBUDAYANIDHI
MANAGER (TECHNICAL)
AUTHORIZED SIGNATORY

11. Acute & Chronic Ecotoxicity effects to Earthworm

<p>Sample Code: 221218</p>  <p>Photograph of Live earthworm in the sample compost at the end of 7 days</p>	<p>Sample Code: 221218</p>  <p>Photograph of Live earthworm in the sample compost at the end of 14 days</p>
<p>The surviving adult earthworms grown in the sample compost exposed to the test material after an incubation period of 14 days is more than 90 % of those from the corresponding blank compost not exposed to any material.</p>	
<p>Sample Code: 221218</p>  <p>Photograph of Live earthworms in the sample compost at the end of 28 days</p>	<p>Sample Code: 221218</p>  <p>Photograph of Live earthworm in the sample compost at the end of 56 days</p>
<p>The surviving adult earthworms grown in the sample compost exposed to the test material after an incubation period of 28 days and the counted number of offspring after an incubation period of 56 days is more than 90 % of those from the corresponding blank compost.</p>	


DR. K. P. BHUVANA
MANAGER (TECHNICAL)
AUTHORIZED SIGNATORY


DR. S. ANBUDAYANIDHI
MANAGER (TECHNICAL)
AUTHORIZED SIGNATORY