

केंद्रीय पेट्रोसायन अभियांत्रिकी
एवं प्रौद्योगिकी संस्थान (सिपेट)

(पुर्व में सेन्ट्रल इंस्टिट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एण्ड टेक्नोलॉजी)
इंस्टिट्यूट ऑफ पेट्रोसायन टेक्नोलॉजी (आई.पी.टी.)

रसायन एवं पेट्रोसायन विभाग

रसायन एवं उर्वरक मंत्रालय, भारत सरकार

एच.आई.एल.कॉलनी, एडयार रोड, पातालम्

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

फोन : 0484-2547741, 2546740

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

वेबसाईट : www.cipet.gov.in



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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. 10099

ANALYSIS REPORT

Issued to :

M/s. Ashima Paper Products

Plot No. G-95, RIICO Industrial Area Khushkhera,

Khushkhera Tehsil: Tijara,

District: Alwar.

Page 1 of 4

Test Report No: 23098

Date: 15.05.2023

Customer Ref. No. & date : Letter dt 29.07.2022

Work order Ref.No. : 274/22-23


As per Standard: : As per part C

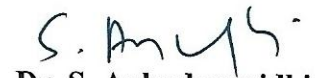
PART A : PARTICULARS OF SAMPLE SUBMITTED

a)Name of the sample	: Compostable BIO PBS Coated Paper Cups 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 carton
(Sealed cartoon/polypouch/container or not)	
f)Date of receipt of sample	: 02.08.2022
g)Date of Performance of test	: 18.08.2022 - 04.05.2023
h)Any other information	: Interim Report No. 22885 dt. 20.02.2023

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

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Ph: 0484-2547741, 2546740

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

Web : www.cipet.gov.in

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ANALYSIS REPORT

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PART C: TEST RESULTS

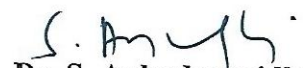
Report No.: 23098

Date: 15.05.2023

Sl. No	Name of the test	Test Method/ Standard	Unit	Results Obtained	Specified Requirement
Sample details: Compostable BIO PBS Coated Paper Cups as stated by the party					
1.	Material Identification	FTIR/DSC	--	Substrate: Cellulose (Paper) Coating: Poly (butylene succinate) (PBS)	--
2.	Disintegration (Dry mass remains in 2mm sieve after 84 days)	Cl. 6.2 of ISO 17088-2021	%	8.92	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	%	91.24 (At the end of 175 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. Anbudayanidhi
Manager (Technical)
Authorized Signatory

Continuation Sheet

ANALYSIS REPORT


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PART C: TEST RESULTS

Report No.: 23098

Date: 15.05.2023

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)	%	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		%	92.18	
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		%	92	
d.	Biomass at the end of 56 days		%	93.11	


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


Dr. S. Anbudayanidhi
Manager (Technical)
Authorized Signatory

Continuation Sheet

ANALYSIS REPORT

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PART C: TEST RESULTS


Report No.: 23098
Date: 15.05.2023

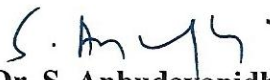
Sl. No.	Property	Test method / Standard	Unit	Results obtained	Specified Requirements (Max.)
7.	<u>Heavy Metal Analysis</u> (on dry mass basis) Arsenic (As) Copper (Cu) Nickel (Ni) Zinc (Zn) Chromium (Cr) Mercury (Hg) Cadmium(Cd) Lead (Pb)	Cl. 6.5.2 of ISO 17088:2021/Cl.4.3 of IS 17899 T:2022	mg / kg	0.9747 1.0204 0.7102 1.2103 2.9237 0.0047 2.0294 0.8049	10 300 50 1000 50 0.15 5 100

PART D: REMARKS: NIL

Note

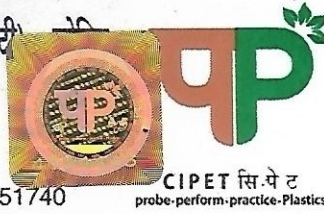
1. This Test Report / Certificate is issued only for the samples submitted to the laboratory.
2. The results stated above related only to the items tested.
3. The quality of the subsequent production lot has to be ensured by the purchaser.
4. This Test Report shall not be reproduced except in full without 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

सिपेट: इंस्टिट्यूट ऑफ प्लास्टिक्स टेक्नोलॉजी (आई पी टी)

रसायन एवं पेट्रो रसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार
जेएनएम केम्पस, एलूर, उद्योगमंडल पी. ओ.
कोच्चि, केरल - 683 501
फोन: 0484-2541750, 2555750, फेक्स: 0484-2551740
ई-मेल: cbpst@cipet.gov.in, cipetkochi@gmail.com
वेबसाइट : www.cipet.gov.in



CIPET: INSTITUTE OF PLASTICS TECHNOLOGY (IPT) - KOCHI

Department of Chemicals & Petrochemicals
Ministry of Chemicals & Fertilizers, Govt. of India
JNM Campus, Eloor, Udyogamandal P. O.
Kochi, Kerala - 683 501

Ph: 0484-2541750, 2555750, Fax: 0484-2551740
Email: cbpst@cipet.gov.in, cipetkochi@gmail.com

Web: www.cipet.gov.in

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ANNEXURE-I

Page 1 of 7

TR. NO.: 23098

ANALYSIS RESULT

Date: 15.05.2023

OBSERVATION FOR BIODEGRADABILITY TEST AS PER ISO 17088:2021

Name of the Customer :

M/s. Ashima Paper Products

Plot No. G-95, RIICO Industrial Area Khushkhera,
Khushkhera Tehsil: Tijara,
District: Alwar.

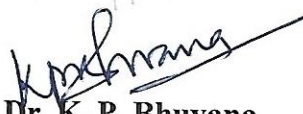
1. Sample Details: Compostable BIO PBS Coated Paper Cups as stated by the party

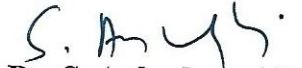
2. Material Identification by FTIR & DSC: Substrate: Cellulose (Paper)
Coating: Poly (butylene succinate) (PBS)

3. Observations:

a. Conditions of reaction Mixture

Origin of Compost	: Livestock excrement, municipal and vegetable waste
Reaction Temperature	: 58°C (±2°C)
Dry Solid (%)	: 51.59 %
Volatile content (%)	: 34.62%
CO ₂ evolved during 1 st 10 days in blank vessels	: 50.75 mg/g of volatile solids of compost
Test Duration (Days)	: 175 Days
Reference material	: Cellulose
Volume of reaction Vessel	: 3000ml


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


Dr. S. Anbudayanidhi
Manager (Technical)
Authorized Signatory



Continuation Sheet

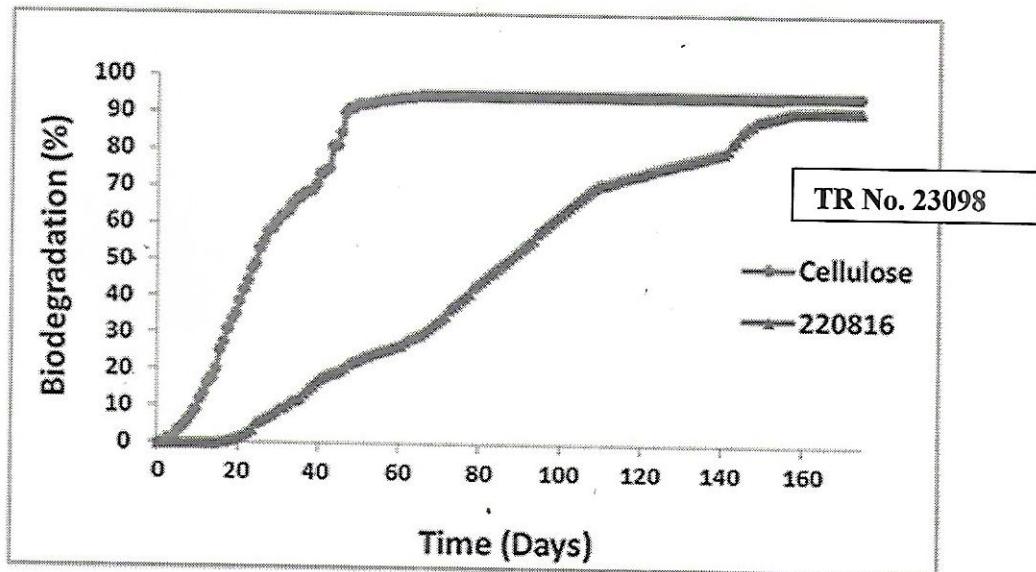
b. pH of test medium

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

4. Result: Percentage biodegradation relative to positive reference

Mean(%) : 91.24%

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



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

Dr. S. Anbudayanidhi
Manager (Technical)
Authorized Signatory


Continuation Sheet


5. Visual observation of Sample

Description	Week 1	Week 9	Week 14	Week 19	Week 25
Structure	Cut Pieces of paper cup Sample	Cut Pieces of paper cup Sample	Disintegrated pieces of paper cup	Disintegrated pieces of paper cup	--
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 9	Week 14	Week 19	Week 25
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

TR. NO.: 23098

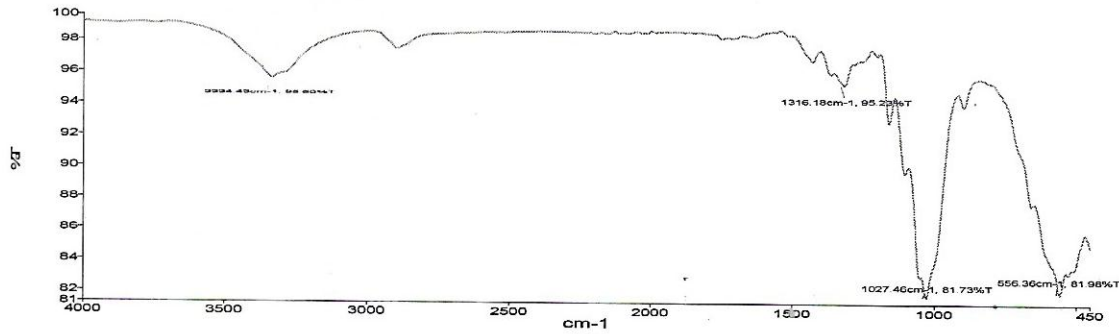
ANALYSIS RESULT

Date: 15.05.2023

Sample Details: Compostable BIO PBS Coated Paper Cups as stated by the party

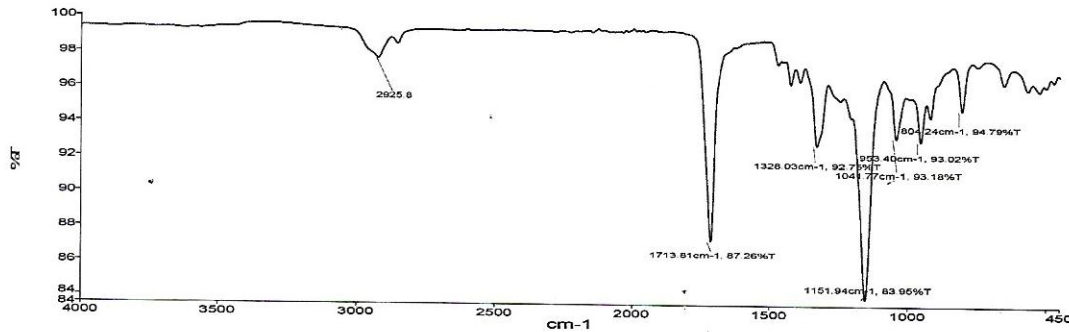
7. FTIR Analysis

FTIR Spectrum of outer layer



Wavenumber(cm ⁻¹)	Nature of Bond
3334.43	O-H stretching vibration
1316.18	O-H bending vibration
1027.46	C-O stretching vibration

FTIR Spectrum of coating



Wavenumber(cm ⁻¹)	Nature of Bond
2925.8	C-H stretching vibration
1713.81	C=O stretching vibration
1328.03	CH ₂ deformational vibration
1151.94	C-O-C stretching vibration
1041.77	O-C-C stretching vibration

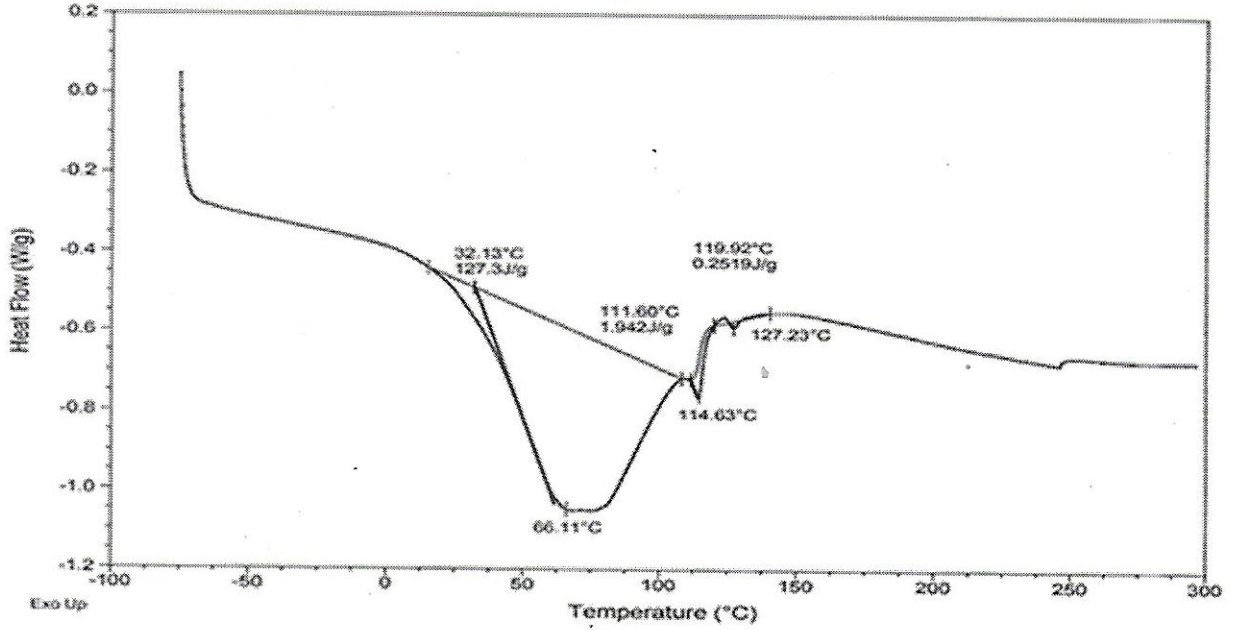
K. P. Bhuvana
Dr. K. P. Bhuvana
Manager (Technical)
Authorized Signatory

S. Anbudayanidhi
Dr. S. Anbudayanidhi
Manager (Technical)
Authorized Signatory





Continuation Sheet

8. DSC Analysis



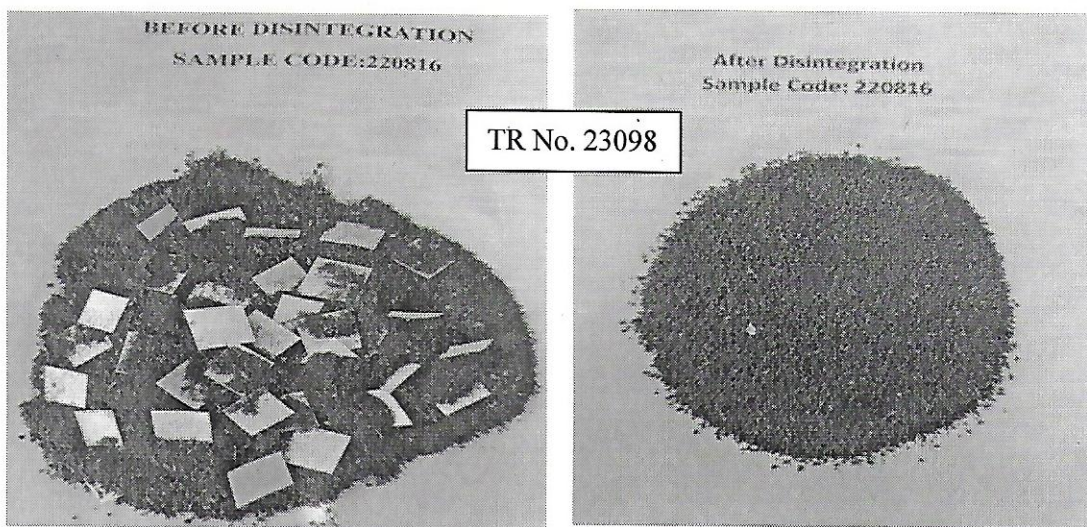
Comment: The above DSC & FTIR analysis indicates the above sample is Cellulose coated with Poly (butylene succinate) (PBS).


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


Dr. S. Anbudayanidhi
Manager (Technical)
Authorized Signatory

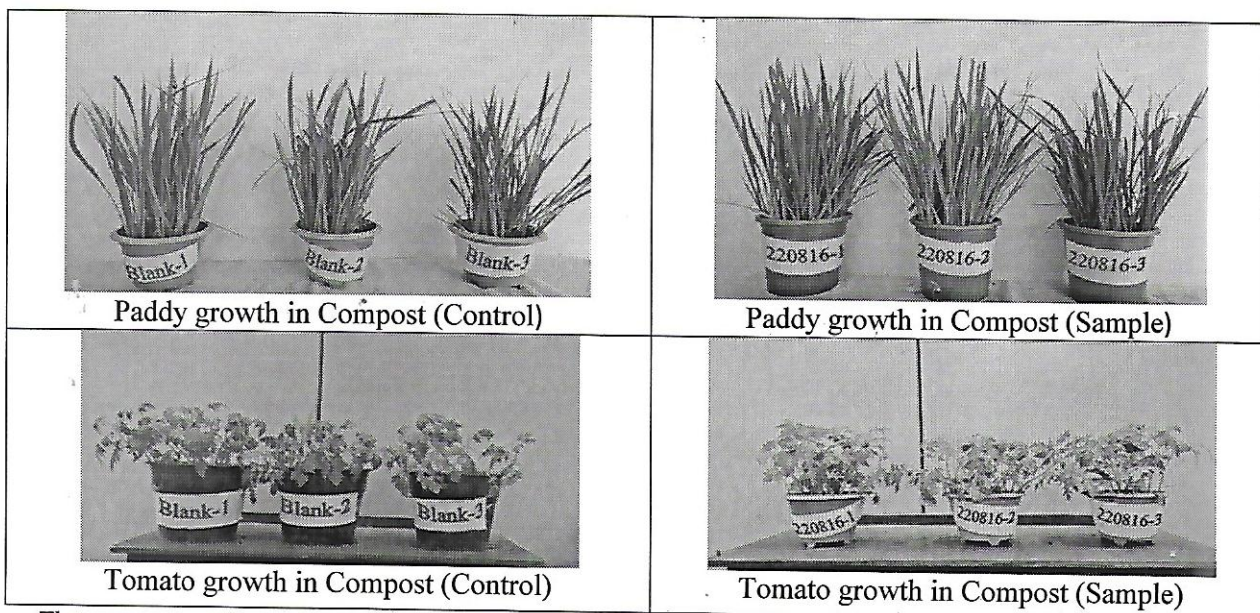
Continuation Sheet

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




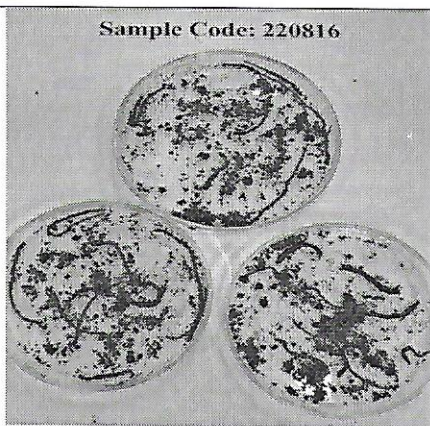
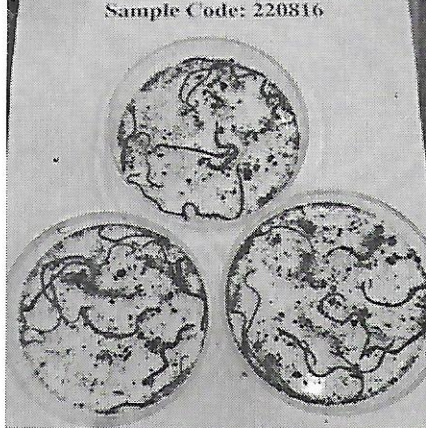
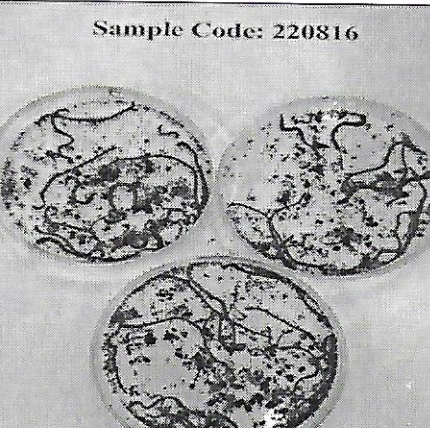
The percentage of seed germination was found to be greater than 90% for both control and sample.



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: 220816</p>  <p>Photograph of Live earthworm in the sample compost at the end of 7 days</p>	<p>Sample Code: 220816</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: 220816</p>  <p>Photograph of Live earthworms in the sample compost at the end of 28 days</p>	<p>Sample Code: 220816</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