

सिपेट: इंस्टिट्यूट ऑफ प्लास्टिक्स

टेक्नॉलाजी (आई पी टी) कोच्चि

रसायन एवं पेट्रोसायन विभाग

रसायन एवं उर्वरक मंत्रालय, भारत सरकार

एच.ए.एल. कॉलोनी, एडयार रोड, पातालम

उद्योगमंडल पी.ओ. कोच्चि, केरल - 683 501

फोन : 0484-2547741, 2546740

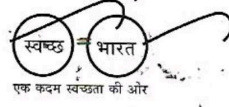
ई-मेल: kochi@cipet.gov.in, cipetkochi@gmail.com

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TECHNOLOGY (IPT) KOCHI

Department of Chemicals & Petrochemicals

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सिपेट:आई पी टी-कोच्चि /परीक्षण/२०२०-२१

CIPET:IPT-Kochi /Testing/2020-21/

दिनांक : ३१.०३.२०२१

Date: 31.03.2021

सेवा में / To

M/s Tirupati Packtech

NH-7, VPO-Kakkarmajra, Near Bus Stand

Distt-Ambala-134202, Haryana

प्रिय महोदय / Dear Sir,

विषय : नमूनों की परीक्षण - संदर्भ में।

Sub.: Final Analysis Report – Reg

Ref.: Letter dt 26.08.2020

Interim Test Report No. 20535 dt 25.01.2021

हम इसके साथ परीक्षण के लिए प्रस्तुत नमूने से संबंधित टेस्ट रिपोर्ट क्रमांक 20677 दिनांकित 31.03.2021 संलग्न कर रहे हैं।

We are enclosing herewith Analysis Report No. 20677 dt. 31.03.2021 pertaining to the samples submitted for testing.

कृपया संलग्न कस्टमर फीडबैक फॉर्म भरकर वापस भेजने का कष्ट करें।

Please find enclosed herewith the feedback form. Kindly fill and send it back to us.

धन्यवाद तथा सबसे अच्छी सेवा देने का आश्वासन के साथ,

Thanking you and assuring you our best services,

सादर, / Yours sincerely,

प्रमुख निदेशक और प्रमुख

Principal Director & Head

संलग्न यथोक्त / Encl. as above.

केन्द्र : अहमदाबाद, अमृतसर, औरंगाबाद, अगरतला, बद्दी, बालासोर, बेंगलूर, भोपाल, भुवनेश्वर, चंद्रपुर, चेन्नै, देहरादून, गुवाहटी, ग्वालियर, हैदराबाद हाजीपुर, हल्दिया, इम्फाल, जयपुर, कोच्चि, लखनऊ, मदुरै, मुरथल, मैसूर, रायपुर, राँची, वलसाड एवं विजयवाडा

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सिपेट: इंस्टिट्यूट ऑफ प्लास्टिक्स टेक्नोलॉजी (आई पी टी) - कोच्चि

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परीक्षण रिपोर्ट
TEST REPORT

क्र. सं. / Sl. No.: 7898

ANALYSIS REPORT

Issued to :

M/s Tirupati Packtech

NH-7, VPO-Kakkarmajra, Near Bus Stand

Distt-Ambala-134202, Haryana

Page 1 of 3

Test Report No : 20677

Date : 31.03.2021

Customer Ref. No. & date : Letter dt 26.08.2020

Work order Ref.No. : 122/2020-21

As per Standard: : As per part C

PART A : PARTICULARS OF SAMPLE SUBMITTED

- a) Name of the sample : Compostable film/sheet sample as stated by party
b) Grade / Variety / type / Size / Class etc. : Nil
c) Code No. : Nil
d) Quantity (pcs/mtr/gm/nos) : 2Kg
e) Mode of Packing : Sealed carton
(Sealed cartoon/polypouch/container or not)
f) Date of receipt of sample : 27.08.2020
g) Date of Performance of test : 28.08.2020-17.03.2021
h) Any other information : Interim Report No. 20535 dt. 25.01.2021

PART B: SUPPLEMENTARY INFORMATION

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

Manjuba K S
TECHNICAL OFFICER

MANAGER (TECHNICAL)
AUTHORISED SIGNATORY



Continuation Sheet

ANALYSIS REPORT

Page 2 of 3

PART C: TEST RESULTS

Report No.:20677

Date: 31.03.2021

Sl. No	Name of the test	Test Method/ Standard	Unit	Results Obtained	Specified Requirement
Sample details: Compostable film/sheet sample as stated by the party					
1.	Material Identification	FTIR/DSC	--	Blend of Polylactic Acid(PLA) and Polybutylene Adipate Co-Terephthalate (PBAT)	--
2.	Disintegration (Dry mass remains in 2mm sieve after 84 days)	ISO 17088:2012 / IS 17088:2008	%	6.74	Not more than 10%
3.	Ultimate aerobic biodegradation (with reference to 100% degradation of positive reference)	ISO 17088:2012 / IS 17088:2008	%	90.11 (at the end of 143days)	>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	ISO 17088:2012 / IS 17088:2008	% % %	92 92	>90 >90

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

Manjula K S
TECHNICAL OFFICER

Manjula K S
MANAGER (TECHNICAL)
AUTHORISED SIGNATORY



Continuation Sheet

ANALYSIS REPORT

Page 3 of 3

PART C: TEST RESULTS

Report No.:20677
Date: 31.03.2021

Sl. No	Name of the test	Test Method/ Standard	Unit	Results Obtained	Specified Requirement
5.	Heavy Metals concentration #	ISO 17088:2012 / IS 17088:2008	mg/l		(Max)
	Arsenic (As)			0.1070	20
	Copper (Cu)			0.0212	500
	Nickel (Ni)			1.7970	100
	Zinc (Zn)			0.3013	2500
	Cobalt (Co)			1.7154	-
	Chromium (Cr)			1.8854	300
	Molybdenum (Mo)			1.3956	-
	Mercury (Hg)			0.3962	10
	Cadmium(Cd)			0.0172	20
	Lead (Pb)			0.2252	500
	Selenium (Se)			1.2240	-

#Note: Based on Municipal Waste (Management and Handling) Rules, 1999 notified on 27th September 1999 by Ministry of Environment and Forests, Government of India. Note that concentration of metals like Cobalt, Molybdenum and Selenium is not mentioned in the notification.

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): Nil

Maryela K
TECHNICAL OFFICER

Rajeev
MANAGER (TECHNICAL)
AUTHORISED SIGNATORY

सिपेट: इंस्टिट्यूट ऑफ प्लास्टिक्स टेक्नोलॉजी (आई पी टी) - कोच्चि

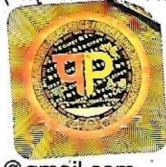
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ANNEXURE-I

Page 1 of 5

TR. NO.: 20677

ANALYSIS RESULT

Date: 31.03.2021

OBSERVATION FOR BIODEGRADABILITY TEST AS PER ISO 17088:2012/ IS 17088:2008

Name of the Customer :

M/s Tirupati Packtech

NH-7, VPO-Kakkarmajra, Near Bus Stand

Distt-Ambala-134202, Haryana

Customer Ref. No. & date : Letter dt 26.06.2020

1. Sample Detail: Compostable film (as declared by the party)

The average thickness of Film sample was observed to be 15 microns.

2. Material Identification by FTIR & DSC: Blend of Polylactic acid (PLA) and
Polybutylene Adipate Co-Terephthalate (PBAT)

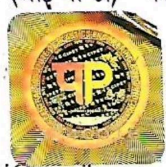
3. Observations :

a. Conditions of reaction Mixture

Origin of Compost	: Livestock excrement, municipal and vegetable waste
Reaction Temperature	: 58°C (±2°C)
Dry Solid (%)	: 51.36 %
Volatile content (%)	: 36.61%
CO ₂ evolved during 1 st 10 days in blank vessels	: 63.46 mg/g of volatile solids of compost
Test Duration (Days)	: 143 Days
Reference material	: Cellulose
Volume of reaction Vessel	: 3000ml


TECHNICAL OFFICER


MANAGER (TECHNICAL)
AUTHORISED SIGNATORY



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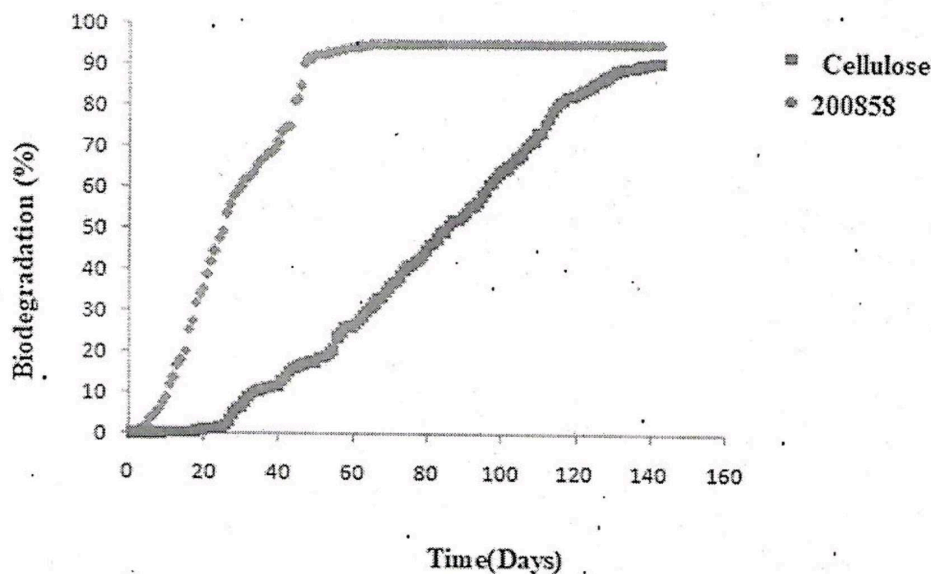
b. pH of test medium

Sl. No	Composting Vessel (Material with test medium)	pH (Before)	pH (After)
1	Sample 1	7.5	7.3
2	Sample 2	7.5	7.2
3	Sample 3	7.5	7.2
4	Blank	7.5	7.2
5	Positive 1	7.5	7.3
6	Positive 2	7.5	7.2
7	Positive 3	7.5	7.3
8	Negative	7.5	7.4

4. Result: Percentage biodegradation relative to positive reference

Mean(%) : 90.11 %

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



Ananjula S
TECHNICAL OFFICER

[Signature]
MANAGER (TECHNICAL)
AUTHORISED SIGNATORY



Continuation Sheet

5. Visual observation of Sample

Description	Week 1	Week 9	Week 13	Week 18	Week 21
Structure	Film Sample	Disintegrated film	Disintegrated film	--	--
Moisture	Adequate moisture level	Adequate moisture level	Adequate moisture level	Adequate moisture level	Adequate moisture level
Colour	Milky 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 13	Week 18	Week 21
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

Manjula J
TECHNICAL OFFICER

[Signature]
MANAGER (TECHNICAL)
AUTHORISED SIGNATORY



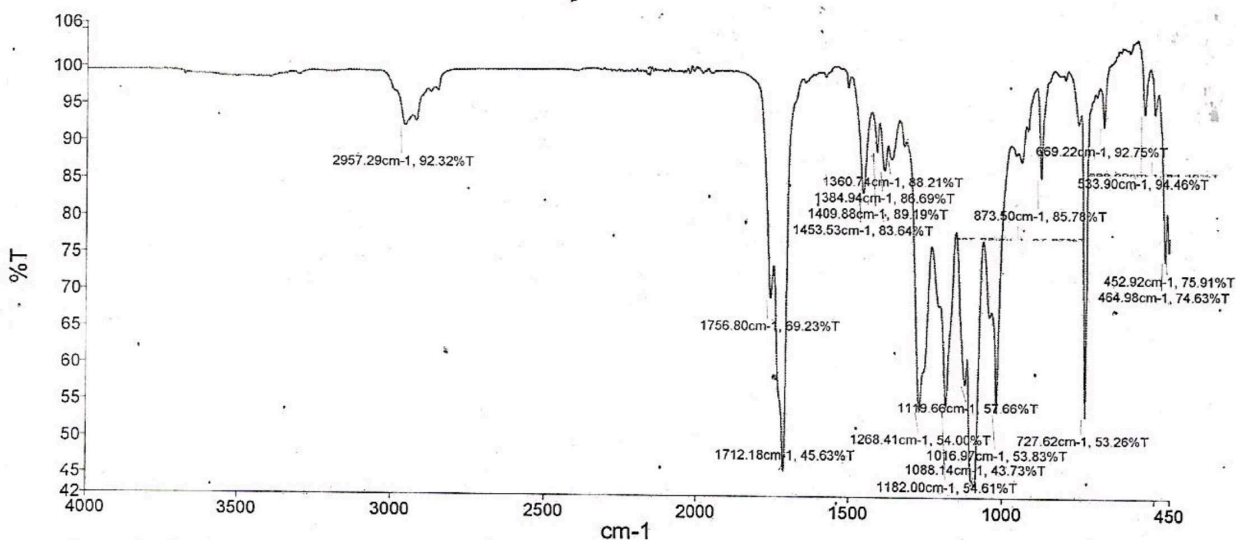
Continuation Sheet

TR. NO.: 20677

ANALYSIS RESULT

Date: 31.03.2021

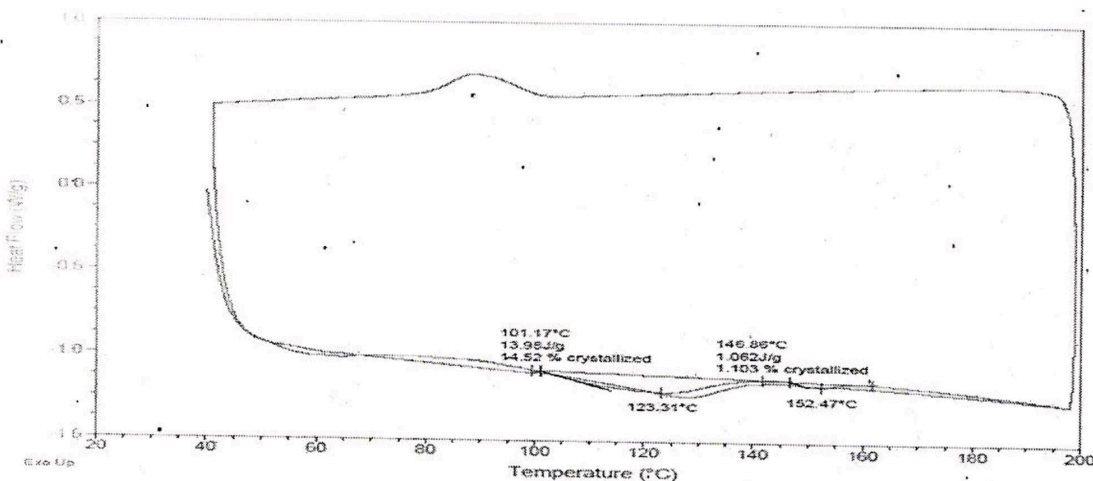
7. FTIR Analysis



Sample Details: Compostable film Sample (as declared by the party)

Wavenumber(cm ⁻¹)	Nature of Bond
2967.29	C-H stretching vibration
1756.80	C=O stretching vibrations
1712.18	C=O stretching vibrations
1453.53	C-H deformation vibration- asym
1119.66	C-O stretching vibration
873.50	C-H rocking vibration

8. DSC Analysis



Comment: The above DSC & FTIR analysis indicates the above sample is Blend of Polylactic acid (PLA) and Polybutylene Adipate Co-Terephthalate (PBAT)

Mangalika K.J.
TECHNICAL OFFICER

[Signature]
MANAGER (TECHNICAL)
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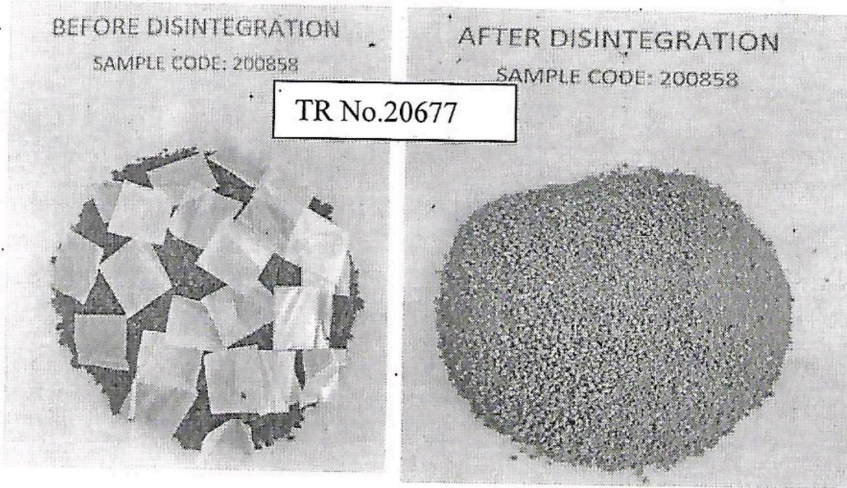


TR. NO.: 20677

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ANALYSIS RESULT

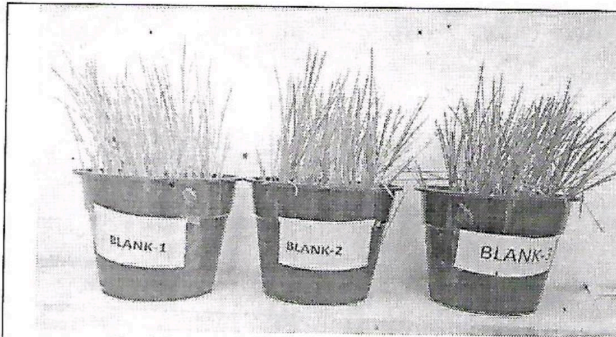
Date: 31.03.2021

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 17088-2012/IS 17088: 2008 was found not more than 10% of original dry mass remain.

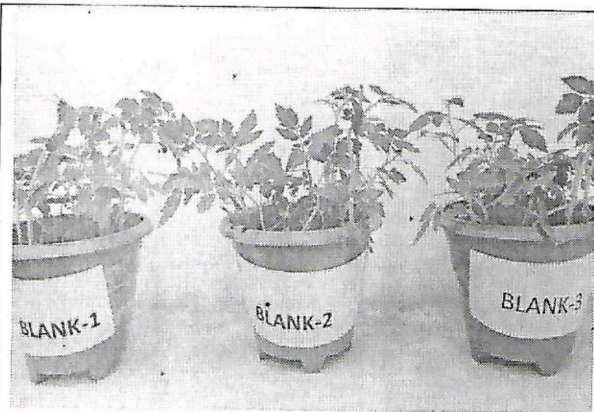
10. SEED GERMINATION AND PLANT GROWTH STUDY



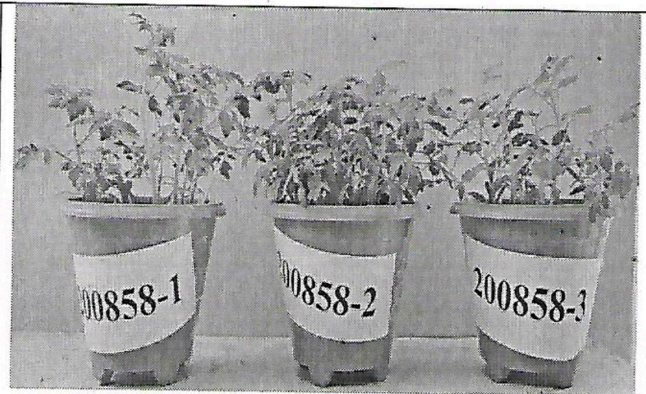
Paddy growth in Compost (Control)



Paddy growth in Compost (Sample)



Tomato growth in Compost (Control)



Tomato growth in Compost (Sample)

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

Mamun
TECHNICAL OFFICER

Devi
MANAGER (TECHNICAL)
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