

**सिपेट: पेट्रोकेमिकल्स तकनीकी
संस्थान (आईपीटी)**

रसायन एवं पेट्रो रसायन विभाग

रसायन एवं उर्वरक मंत्रालय, भारत सरकार

गिण्डी, चेन्नई - 600 032.

फोन : 91-44-2225 4701 (6 लाइन)

ई-मेल : chennai@cipet.gov.in

वेबसाइट : www.cipet.gov.in



**CIPET: INSTITUTE OF PETROCHEMICALS
TECHNOLOGY (IPT)**

Department of Chemicals & Petrochemicals

Ministry of Chemicals & Fertilizers, Govt. of India

Guindy, Chennai - 600 032.

Phone : 91-44-2225 4701 (6 Lines)

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Website : www.cipet.gov.in



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Azadi Ka
Amrit Mahotsav

संदर्भ/Ref: परीक्षण/TR/ 24071421

दिनांक/Date: 26-02-2025

प्रति /To,

PROVIVA ORGANICS PRIVATE LIMITED

Survey No.271-Madhav Industrial Hub, Kanera, Kheda -
387540 , Gujarat

विषय/Sub : Testing of samples-reg.

संदर्भ/Ref : Your letter no. --

Dated: 02-05-2024

महोदय,

कृपया हमारी परीक्षण रिपोर्ट क्रमांक प्राप्त करें। Please find enclosed herewith our Test Report no.	79940	दिनांक dated	26-02-2025
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धन्यवाद,

भवदीय

अधिकृत हस्ताक्षरकर्ता

संलग्न : उपर्युक्तानुसार

Encl:1.a/a.

मुख्यालय : सिपेट, गिण्डी, चेन्नई - 600 032. Head Office : CIPET, Guindy, Chennai - 600 032.

केन्द्र : अहमदाबाद, अमृतसर, औरंगाबाद, अगरतला, बदी, बालासोर, बेंगलुरु, भोपाल, भुवनेश्वर, भावनगर, भागलपुर, चन्द्रपुर, चेन्नई, देहरादून, दिल्ली, गुवाहाटी, ग्वालियर, हैदराबाद, हाजीपुर, हल्दिया, इम्फाल, जयपुर, कोच्चि, कोरबा, लखनऊ, मदुरै, मुरथल, मैसूरु, नवसारी, पारादीप, पालक्काड, रायपुर, राँची, तामोट, वाराणसी एवं विजयवाड़ा

Centres : Ahmedabad, Amritsar, Aurangabad, Agartala, Baddi, Balasore, Bengaluru, Bhopal, Bhubaneswar, Bhavnagar, Bhagalpur, Chandrapur, Chennai, Dehradun, Delhi, Guwahati, Gwalior, Hyderabad, Hajipur, Haldia, Imphal, Jaipur, Kochi, Korba, Lucknow, Madurai, Murthal, Mysuru, Navsari, Paradip, Palakkad, Raipur, Ranchi, Tamot, Varanasi & Vijayawada

केंद्रीय पेट्रोसायन अभियांत्रिकी एवं
प्रौद्योगिकी संस्थान
पेट्रोकेमिकल्स तकनीकी संस्थान

रसायन एवं पेट्रोसायन विभाग
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को जारी/
Issued to :

परीक्षण रिपोर्ट / TEST REPORT

क्र.सं. / SI. No. 36530

रिपोर्ट सं. / REPORT NO. 79940

दिनांक / Date : 26-02-2025

Pages.....Nos. Part A,B,C & D
02-05-2024

संदर्भ / Customer Let. Ref : --

परीक्षण मानक स्तर के अनुसार परीक्षण रिपोर्ट / TEST REPORT AS PER TEST STANDARD : Refer Part C

भाग - क / PART - A

प्रस्तुत सैंपिल का विवरण / PARTICULARS OF SAMPLE SUBMITTED

- अ) सैंपिल का नाम / a) Name of the Sample : 100% Compostable Film (PBAT and PLA) - as stated by party
- आ) सैंपिल प्राप्त होने की तारीख / b) Date of Receipt of sample : 17-07-2024
- इ) ग्रेड/प्रकार/आकार/वर्ग / c) Grade / variety / type / size / class : Nil
- ई) घोषित मूल्य / d) Declared value, If any : Nil
- उ) कोड सं. / e) Code No. : Nil
- ऊ) बैच सं. एवं निर्माण तारीख / f) Batch No. and Date of Manufacture: Nil
- ऋ) मात्रा / g) Quantity : 2kg
- ए) पैकिंग की रीति / h) Mode of Packing : carton packing
- ऐ) मोहर बंद या नहीं / i) Sealed or not : Sealed
- ओ) कोई अन्य सूचना / j) Any other information :

24071421

भाग - ख / PART - B

अनुपूरक सूचनाएँ / SUPPLEMENTARY INFORMATIONS

- अ) सैंपिलिंग कार्यवाहियों हेतु संदर्भ / a) Reference to sampling procedure : Sampling not done by this lab
- आ) माप करने हेतु लिए गए सहायक दस्तावेज एवं प्राप्त परिणाम
b) Supporting documents for the measurement taken and result derived : As given in Part C
- इ) संबंधित कार्य अनुदेशों में निर्धारित के अनुसार परीक्षण रीति से कोई परिवर्तन
c) Deviation from the test method as prescribed in relevant work instructions, if any : No deviation from the standard

[Signature]

[Signature]

केंद्रीय पेट्रोसायन अभियांत्रिकी एवं
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सिपेट CIPET



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परीक्षण रिपोर्ट / TEST REPORT

रिपोर्ट सं / REPORT NO. : 79940

क्र.सं / SI. No. 36530

दिनांक / Date : 26-02-2025

भाग - ग / PART - C

Test Duration : 18-07-2024 to 26-02-2025 परीक्षण परिणाम / TEST RESULTS

Sl. No.	Name of the test	Test method / Standard	unit	Results Obtained	Specific Requirements
1	Material Identification	FTIR & DSC	-	Blend of Poly Lactic Acid and Poly butylene adipate-co-terephthalate	-
2	Disintegration (Dry mass remains in 2 mm sieve after 84 days)	ISO 17088:2021 Cl.no. 6.2	%	8.2	Not more than 10
3	Ultimate aerobic Biodegradation (with reference to 100% degradation of positive reference)	ISO 17088:2021 Cl.no. 6.3	%	91.1 (At the end of 136 days)	> 90 (At the end of the test period not more than 180 days.)
4	Monocotyledon (Onion) % Seed emergence	ISO 17088:2021 Cl.no. 6.4.3	%	100	> 90
	Dicotyledon (Fenugreek) % Seed Emergence		%	98	> 90
5	Acute Ecotoxic effects to earthworm	ISO 17088:2021 Cl.no. 6.4.4	%		
a	Survival of adult earthworm at the end of 7 days			100	Shall be more than 90
b	Survival of adult earthworm at the end of 14 days			98	Shall be more than 90
c	Biomass end of the 14 days			97	Shall be more than 90
6	Chronic ecotoxic effects to earthworm	ISO:17088:2021 Cl.no. 6.4.5	%		
a	Survival of adult earthworm at the end of 28 days			93	Shall be more than 90
b	Survival of adult earthworm at the end of 56 days			92	Shall be more than 90
c	Offspring at the end of 56 days			92	Shall be more than 90
d	Biomass end of the 56 days			96	Shall be more than 90

The detailed observation on biodegradability test is enclosed as Annexure

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Survey No.271-Madhav industrial Hub,
Kanera, Kheda-387540, Gujarat

Customer Letter Ref. -- dtd 2-5-2024

2 of

AUTHORISED SIGNATORY
Dr. Radhashyam Giri
Technical Officer

AUTHORISED SIGNATORY
S. Udhayamalar,
Manager (Tech.)

रिपोर्ट सं / REPORT NO. : 79940

परीक्षण परिणाम / TEST RESULTS

दिनांक /Date : 26-02-2025

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Survey No.271-Madhav industrial Hub,
Kanera , Kheda-387540, Gujarat

Customer Letter Ref. -- dtd 02-05-2024

PART C - TEST RESULTS

Sl.No	Name of the Test	Test Method/ Standard	Unit	Results Obtained	Specified Requirements*
7	Heavy metals concentration				
a.	Arsenic (As)			BDL(DL:0.006)	10
b.	Copper (Cu)			0.3442	300
c.	Nickel (Ni)			0.054	50
d.	Zinc (Zn)			9.6562	1000
e.	Cobalt (Co)	ISO		BDL(DL:0.004)	-
f.	Chromium (Cr)	17088:2021	mg/kg	3.8182	50
g.	Molybdenum (Mo)			BDL(DL:0.006)	-
h.	Mercury (Hg)			0.005	0.15
i.	Cadmium (Cd)			BDL(DL:0.003)	5
j.	Lead (Pb)			0.552	100
k.	Selenium (Se)			0.1477	-
* Based on Municipal solid waste (Management and Handling) Rules, 2016 notified on 8th April, 2016 by Ministry of Environment , Forests and climate change, Government of India. Note that concentration of metals like cobalt, molybdenum, and selenium is not mentioned in the notification.					
Note : BDL - Blow Detection Limit ; DL - Detection Limit .					

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


AUTHORISED SIGNATORY
Dr. Radhashyam Giri


AUTHORISED SIGNATORY
S. Gunayamalar,
Manager (Tech)



रिपोर्ट सं / REPORT NO. : 79940

परीक्षण परिणाम / TEST RESULTS

दिनांक /Date : 26-02-2025

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Customer Letter Ref. -- dtd 02-05-2024

OBSERVATION FOR BIODEGRADABILITY TEST AS PER ISO 17088:2021

- 1 **Sample Details (As stated by Party):** Compostable film
2 **Material Identification by FTIR :** Blend of Poly Lactic Acid And Poly butylene adipate co terephthalate

BIODEGRADABILITY TEST AS PER ISO:14855-1

3 **Observation**

(i) Conditions of reaction mixtures

Origin of Compost: Livestock excrement, municipal and vegetable waste

Reaction Temperature (°C) : 58
Dry Solid (%) : 53.42
Volatile content (%) : 17.85
CO₂ evolved during first 10days in blank : 50.47 mg/g
Test duration (days) : 136 days
Reference material : Cellulose
Volume of reaction vessel (mL) : 3000 ml

(ii) pH of test medium

S.No.	Compost Vessel	pH (Before)	pH (After)
1	Blank 1	7.4	7.3
2	Blank 2	7.2	7.2
3	Blank 3	7.2	7.1
4	Cellulose 1	7.2	7.1
5	Cellulose 2	7.2	7.2
6	Cellulose 3	7.3	7.2
7	Negative 1	7.4	7.3
8	Negative 2	7.4	7.3
9	Negative 3	7.3	7.1
10	Sample 1	7.2	7.2
11	Sample 2	7.2	7.2
12	Sample 3	7.1	7.1

Contd.,

रिपोर्ट सं / REPORT NO. : 79940

परीक्षण परिणाम / TEST RESULTS

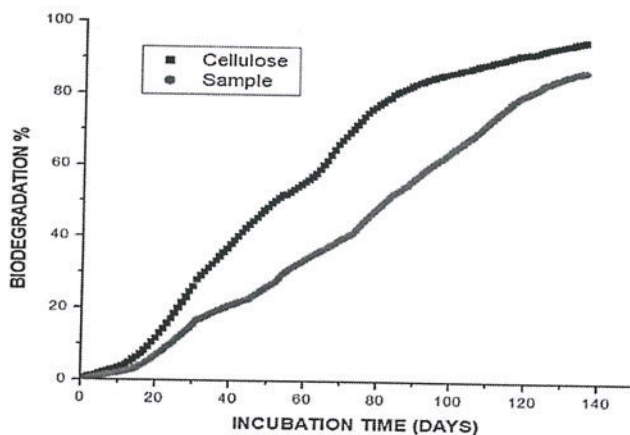
दिनांक /Date : 26-02-2025

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Kanera , Kheda-387540, Gujarat

Customer Letter Ref. -- dtd 02-05-2024

4 Result: Percentage of biodegradation relative to positive reference

Sample (Mean) : 91.1 % at the end of 136 days
The reference Material - cellulose : ~ 100%



5 visual Observation of Sample

Description	Week 1-4	Week 5-8	Week 9-12
Structure	Cut pieces	Cut pieces	Fragmented pieces
Moisture	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level
Colour	White	Dirty	Dirty
Fungal Development	Nil	Nil	Nil
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like

Description	Week 13-16	Week 17-18	Week 19-20
Structure	Fragmented pieces	Fragmented pieces	Fragmented pieces
Moisture	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level
Colour	Dirty	Dirty	Dirty
Fungal Development	Nil	Nil	Nil
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like

Contd.,



रिपोर्ट सं / REPORT NO. : 79940

परीक्षण परिणाम / TEST RESULTS

दिनांक /Date :26-02-2025

Issued to: M/S Provia Organics Private Limited
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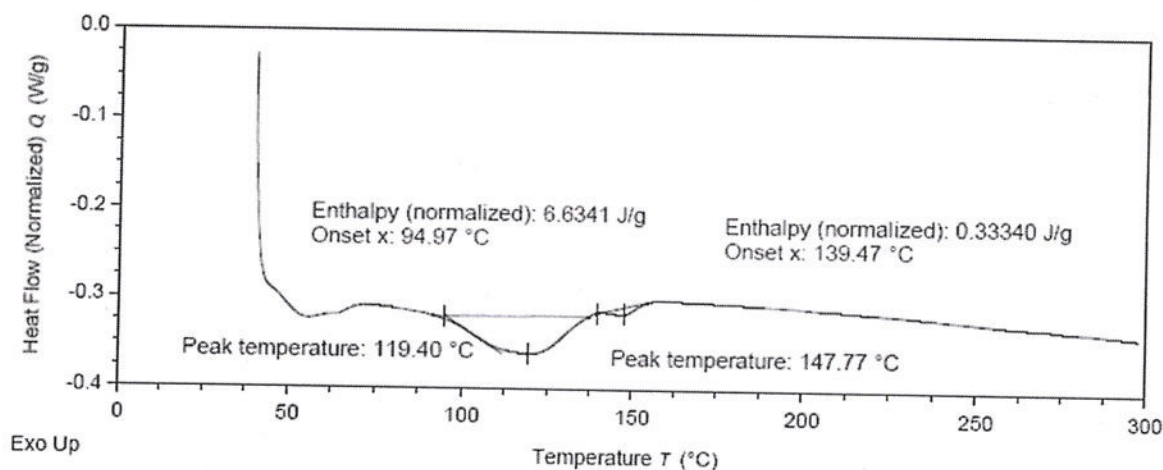
6 Visual Observation of Compost

Description	Week 1-4	Week 5-8	Week 9-12
Structure	Fine Particles	Fine Particles	Fine Particles
Moisture	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level
Colour	Dark Brown	Dark Brown	Dark Brown
Fungal Development	Nil	Nil	Nil
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like

Description	Week 13-16	Week 17-18	Week 19-20
Structure	Fine Particles	Fine Particles	Fine Particles
Moisture	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level
Colour	Dark Brown	Dark Brown	Dark Brown
Fungal Development	Nil	Nil	Nil
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like

7 DSC Analysis

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Contd.,

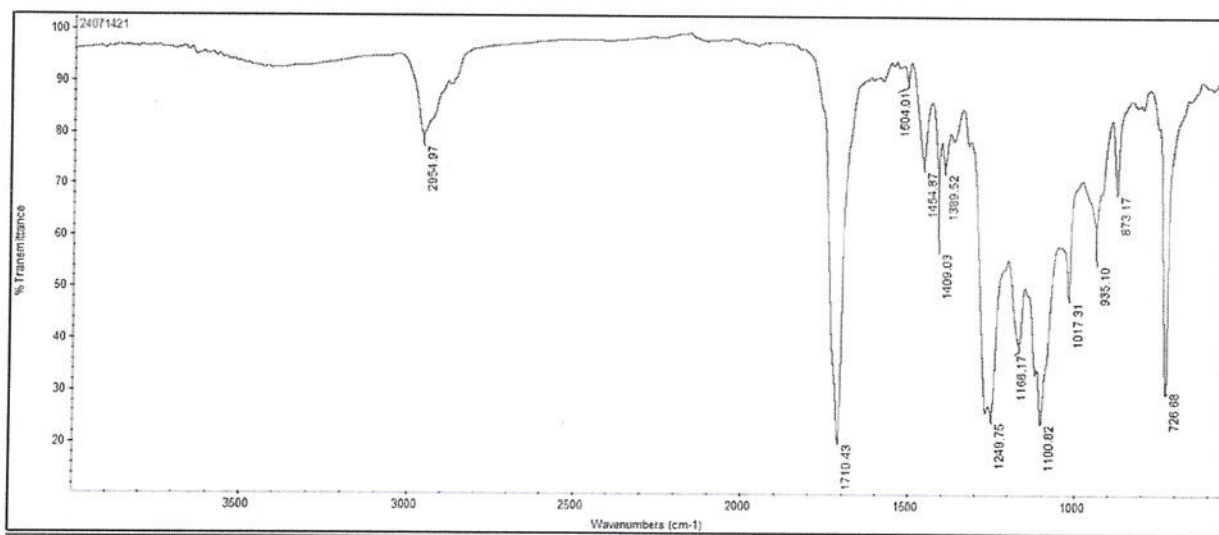
रिपोर्ट सं / REPORT NO. : 79940

परीक्षण परिणाम / TEST RESULTS

दिनांक /Date : 26-02-2025

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8 FTIR Analysis



FTIR Interpretation

Wave number (cm ⁻¹)	Nature of Bond
2954	C-H stretch
1710	C=O stretch in PLA & PBAT
1504	C=C stretch
1454	C-H in Plane bend
1166	C-C stretch
1017	C-O stretch
873	C-H bend
726	C-H bend

Comment: The above DSC & FTIR analysis indicates the above sample is Blend of Poly Lactic Acid and Poly butylene adipate co terephthalate

Contd.,



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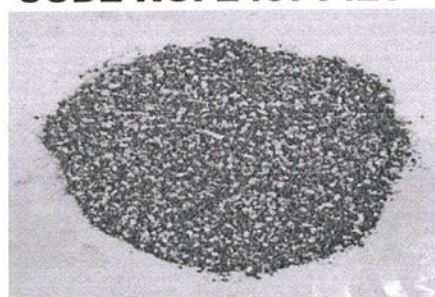
9 Disintegration After 12 Weeks

CODE NO: 24071421



Before Disintegration

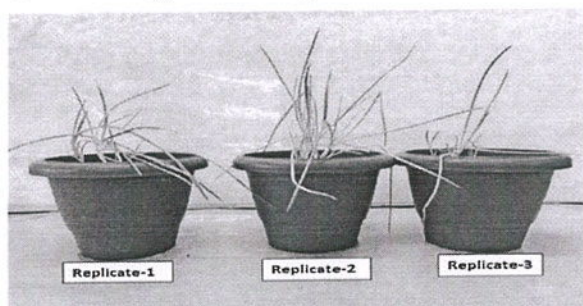
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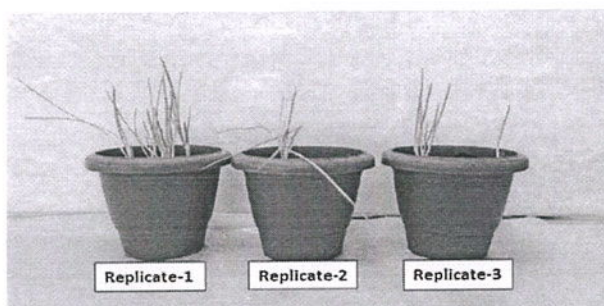
After Disintegration

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.

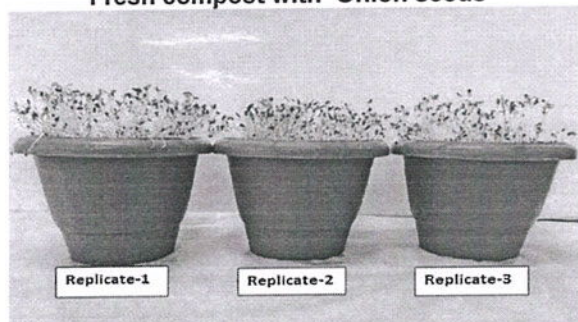
10 Plant growth study



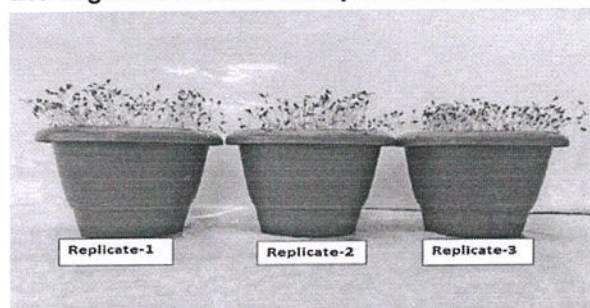
Fresh compost with Onion seeds



Bio-degradation tested compost with Onion seeds



Fresh compost with Fenugreek



Bio-degradation tested compost with Fenugreek

The percentage of seed germination rate is found to be greater than 90% for both Onion and Fenugreek