

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

रसायन एवं पेट्रोसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार
गिण्डी, चेन्नई - 600 032.
फोन : 91-44-2225 4701 (6 लाइन)
ई-मेल : chennai@cipet.gov.in
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**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)
Email : chennai@cipet.gov.in
Website : www.cipet.gov.in

संदर्भ/Ref: परीक्षण/TR/ 25012766

दिनांक/Date: 04-09-2025

प्रति /To,

BAG A SOIL

10-79, Aralla Road, Near Kaapu Ramalayam, Jagannadhapuram,
West Godavari, Andhra Pradesh, 534145

विषय/Sub : Testing of samples-reg.

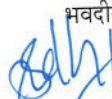
संदर्भ/Ref : Your letter no. --

Dated: 06-01-2025

महोदय,

कृपया हमारी परीक्षण रिपोर्ट क्रमांक प्राप्त करें। Please find enclosed herewith our Test Report no.	81980	दिनांक dated	04-09-2025
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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, बड्डी, बालासोर, बेंगलूर, भोपाल, भुवनेश्वर, भावनगर, भागलपुर, चन्द्रपुर, चेन्नई, देहरादून, दिल्ली, गुवाहाटी, ग्वालियर, हैदराबाद, हाजीपुर, हल्दिया, इम्फाल, जयपुर, कोच्चि, कोरवा, लखनऊ, मदुरै, मुरथल, मैसूरु, नवसारी, पारादीप, पालक्काड, रायपुर, राँची, तामोड, वालसाड, वाराणसी एवं विजयवाडा
Centers : Ahmedabad, Amritsar, Aurangabad, Agartala, Baddi, 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, Rajpur, Ranchi, Tamot, Valsad, Varanasi & Vijayawada

केंद्रीय पेट्रोसायन अभियांत्रिकी एवं
प्रौद्योगिकी संस्थान
पेट्रोकेमिकल्स तकनीकी संस्थान

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परीक्षण रिपोर्ट / TEST REPORT

को जारी /
Issued to :

BAG A SOIL

10-79, Aralla Road, Near Kaapu Ramalayam,
Jagannadhapuram, West Godavari, Andhra Pradesh,
534145

क्र.सं / Sl. No. **37482**

रिपोर्ट सं / REPORT NO. : **81980**

दिनांक / Date : **04-09-2025**

Pages.....Nos. Part A,B,C & D

संदर्भ / Customer Let. Ref : --

06-01-2025

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 : PBAT Film - as stated by party
- आ) सैंपिल प्राप्त होने की तारीख / b) Date of Receipt of sample : 22-01-2025
- 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 : 1.5 kg
- ए) पैकिंग की रीति / h) Mode of Packing : Packed in envelope
- ऐ) मोहर बंद या नहीं / i) Sealed or not : Sealed
- ओ) कोई अन्य सूचना / j) Any other information : --

25012766

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

केंद्रीय पेट्रोसायन अभियांत्रिकी एवं
प्रौद्योगिकी संस्थान

पेट्रोकेमिकल्स तकनीकी संस्थान

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परीक्षण रिपोर्ट / TEST REPORT

रिपोर्ट सं / **REPORT NO. 81980**

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दिनांक / Date : **04-09-2025**

भाग - ग / PART - C

परीक्षण परिणाम / TEST RESULTS

TEST RESULTS

Test Duration : 24-01-2025 to 04-09-2025

Sl. No.	Name of the test	Test method / Standard	unit	Results Obtained	Specific Requirements
1	Material Identification	FTIR & DSC	-	Poly butylene adipate-co-terephthalate	-
2	Disintegration (Dry mass remains in 2 mm sieve after 84 days)	ISO 17088:2021 Cl.no. 6.2	%	8.7	Not more than 10
3	Ultimate aerobic Biodegradation (with reference to 100% degradation of positive reference)	ISO 17088:2021 Cl.no. 6.3	%	90.6 (At the end of 145 days)	> 90 (At the end of the test period not more than 180 days.)
4	Plant Growth test				
	Monocotyledon (Rice) % Seed emergence	ISO 17088:2021 Cl.no. 6.4.3	%	96	> 90
	Dicotyledon (Fenugreek) % Seed Emergence		%	98	> 90
5	Acute Ecotoxic effects to earthworm	ISO 17088:2021 Cl.no. 6.4.4	%		
a	Survial of adult earthworm at the end of 7 days			100	Shall be more than 90
b	Survial of adult earthworm at the end of 14 days			100	Shall be more than 90
c	Biomass end of the 14 days			98	Shall be more than 90
6	Chronic ecotoxic effects to earthworm	ISO 17088:2021 Cl.no. 6.4.5	%		
a	Survial of adult earthworm at the end of 28 days			100	Shall be more than 90
b	Survial of adult earthworm at the end of 56 days			97	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			92	Shall be more than 90

The detailed observation on biodegradability test is enclosed as Annexure

रिपोर्ट सं / REPORT NO. : 81980

परीक्षण परिणाम / TEST RESULTS

04-09-2025
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Customer Letter Ref., dtd. 06-01-2025

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)			0.4015	10
	b. Copper (Cu)			0.1523	300
	c. Nickel (Ni)			0.0539	50
	d. Zinc (Zn)			0.1571	1000
	e. Cobalt (Co)	ISO	mg/kg	Not Detected	-
	f. Chromium (Cr)	17088:2021		0.6978	50
	g. Molybdenum (Mo)			0.7946	-
	h. Mercury (Hg)			Not Detected	0.15
	i. Cadmium (Cd)			0.0081	5
	j. Lead (Pb)			0.0135	100
	k. Selenium (Se)			0.0138	-


* 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 : ND - Not Detected

PART D - REMARKS

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
Technical Officer


AUTHORISED SIGNATORY
S. Udhayamalar,
Manager (Tech.)

रिपोर्ट सं / REPORT NO. : 81980

परीक्षण परिणाम / TEST RESULTS

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OBSERVATION FOR BIODEGRADABILITY TEST AS PER ISO 17088:2021

- 1 Sample Details (As stated by Party): PBAT Film
2 Material Identification by FTIR : 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 (%) : 27.14
CO₂ evolved during first 10days in blank : 51.96 mg/g
Test duration (days) : 145 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	7.12	7.18
2	Blank 2	7.14	7.11
3	Blank 3	7.18	7.18
4	Cellulose 1	7.41	7.31
5	Cellulose 2	7.43	7.38
6	Cellulose 3	7.46	7.28
7	Negative 1	7.24	7.18
8	Negative 2	7.23	7.26
9	Negative 3	7.27	7.22
10	Sample 1	7.28	7.26
11	Sample 2	7.25	7.23
12	Sample 3	7.29	7.26

Contd.,

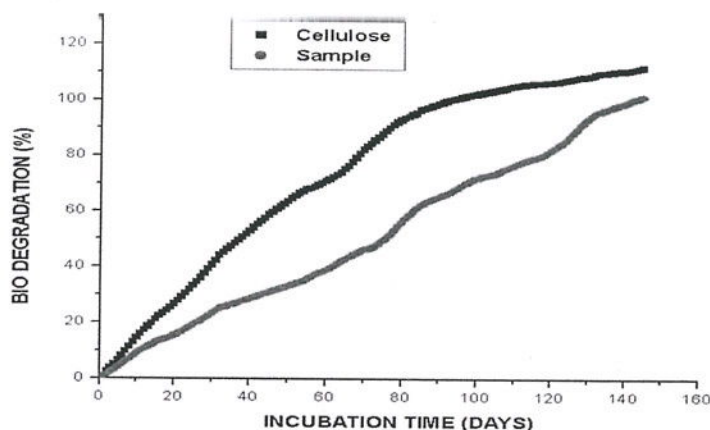

AUTHORISED SIGNATORY
Dr. Radhashyam Giri
Technical Officer


AUTHORISED SIGNATORY
S. Udayamalar,
Manager (Tech.)



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- 4 **Result:** Percentage biodegradation relative to positive reference
Sample (Mean) : 90.6 % at the end of 145 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 19-21
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. : 81980

परीक्षण परिणाम / TEST RESULTS

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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 19-21
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

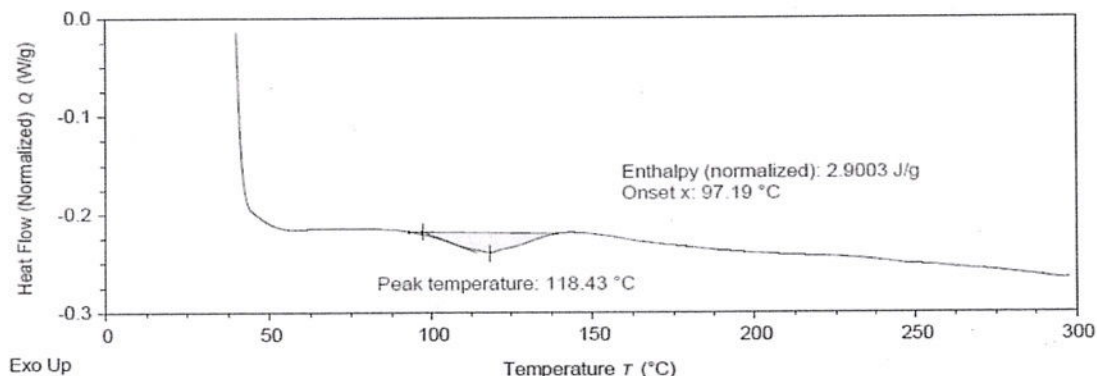
7 DSC Analysis

25012766

DSC25,06-05-2025 16:46:22
5.000 mg
Tzero Aluminum

cipet chn
C:\DSC Data\25012766.tri

25012766



AUTHORISED SIGNATORY

Dr. Radhashyam Giri

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S. Udhayamalar,
Manager (Tech.)

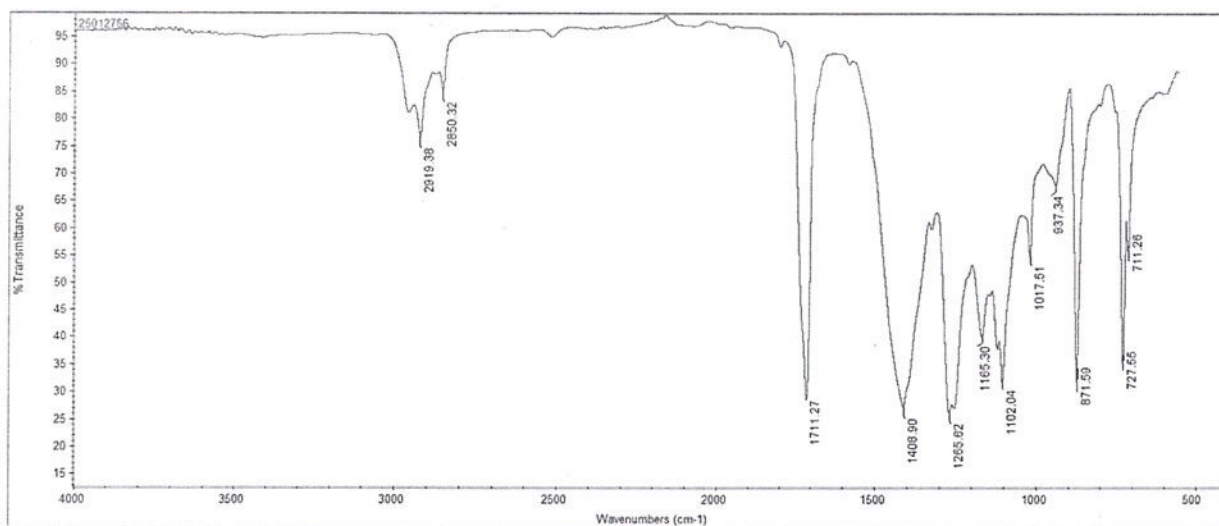
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8 FTIR Analysis



FTIR Interpretation

Wave number (cm ⁻¹)	Nature of Bond
2919	O-H stretch
1711	C=O stretch
1408	O-H bending
1265	C-O stretch
1165	C-O stretch
1017	C=O stretch
871	C-H bend
727	C-H bend

Comment: The above DSC & FTIR analysis indicates the above sample is Poly butylene adipate co terephthalate

Contd.,

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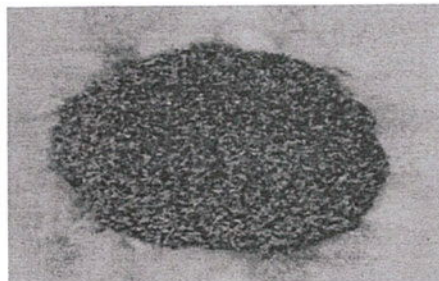
9 Disintegration After 12 Weeks

CODE NO: 25012766



Before Disintegration

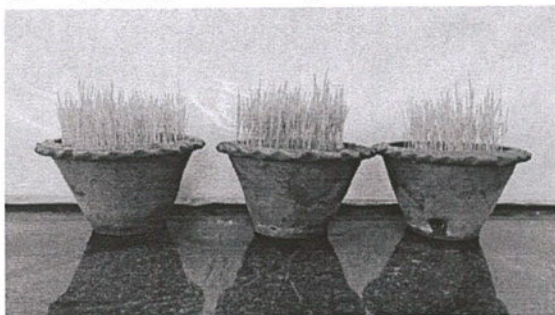
CODE NO: 25012766



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 Rice Grains



Bio-degradation tested compost with Rice Grains



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 Rice and Fenugreek

AUTHORISED SIGNATORY

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