केंद्रीय पेट्रोरसायन अभियांत्रिकी एवं पौद्योगिकी संस्थान
रसायन एवं पेट्रोरसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार
सरवे नं-३७७, सूरमपल्ली एक्स रोड, गन्नवरम (म)
विजयवाडा - ५२१ २१२, कृष्ण जिल्ला
फोन : 0866 - 2591466.
वेबसाइट : www.cipet.gov.in
ई-मेल : vijayawada@cipet.gov.in

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CENTRAL INSTITUTE OF PETROCHEMICALS ENGINEERING & TECHNOLOGY
Department of Chemicals & Petrochemicals
Ministry of Chemicals & Fertilizers, Govt. of India
Survey No. 377, Surampalli X Road, Gannavaram (M),
Vijayawada - 521 212, Krishna District
Phone : 0866 - 2591466
Web : www.cipet.gov.in
E-mail : vijayawada@cipet.gov.in

सिपेट / विजयवाड़ा / पीटीसी / 2023–24
CIPET/VJA/PTC/2023-24

दिनांक : 21.03.2024
Date : 21.03.2024

सेवा मे
To

M/S AICMT INTERNATIONAL PRIVATE LIMITED
Bharath's 63 North, Ground Floor, Aditya Gardens 3rd Lane,
Plot Number-63&64, Bachupally, Medchal, Malkajgiri , Pin 500090

Sub: Test Report – Reg
Ref: Letter No. Your Email Dated. 23.05.2023

प्रिय महोदय, / Dear Sir,

उपरोत्क विशय के संदर्भ में, कृपया इस पत्र के साथ परीक्षण प्रतिवेदन सं : 002987(S) दि: 21.03.2024 एतथा प्रतिपुष्टी प्रात्प संलग्नीय हैं । कृपया इसे भरकर हमें वापस लौटा दे ।

With reference to the above cited subject, we are enclosing herewith Supplementary Test Report No. 002987(S) dated 21.03.2024 Invoice. We are also enclosing herewith feedback form. Kindly fill it and sent it back to us.

धन्यवाद तथा अच्छी सेवा के आश्तासन के साथ।

Thanking you and assuring you of our best services.

आपका भवदिय, / Yours faithfully,

Joint Director & Head
संलग्न : यथोक्त / Encl : As above

केंद्रीय पेट्रोरसायन अभियांत्रिकी एवं पौघोगिकी संस्थान (सिपेट)
रसायन एवं पेट्रोरसायन विभाग, रसायन एवं उर्वरक मंत्रालय, भारत सरकार
सरवे नं-३७७, सुरमपल्ली एक्स रोड , गन्नवरम (म), विजयवाडा - ५२१ २१२, कृष्ण जिल्हा

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CENTRAL INSTITUTE OF PETROCHEMICALS ENGINEERING & TECHNOLOGY (CIPET)
Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Govt. of India)
Survey No. 377, Surampalli X Roads, Gannavaram (M), Vijayawada - 521 212, Krishna District
Phone : 0866 - 2591466
Web : www.cipet.gov.in, E-mail : vijayawada@cipet.gov.in

No. : 000959

Plastics Testing Centre
Test Report

Issued to :
M/S AICMT INTERNATIONAL PRIVATE LIMITED
Bharath's 63 North. Ground Floor. Aditya Gardens 3rd Lane.
Plot Number-63&64, Bachupally, Medchal, Malkajgiri , Pin 500090

Test Report No : 002987(S) Date: 21.03.2024
Customer Ref. No. & date : Letter No. Your Email Dated. 23.05.2023
Work order Ref. No. : 2023/08/157
Test Report as per Standard: : As per IS 17088:2021 Page No.: 01 of 04

PART A : PARTICULARS OF SAMPLE SUBMITTED

a) Nature of Sample	: Compostable carry bags as declared by the party
b) Grade/Variety/ Type/Size/Class etc	: Nil
c) Brand name, if any	: Nil
d) Declared values, if any	: Nil
e) Code No.	: Nil
f) Batch No. and date of Manufacture	: Nil
g) Quantity	: 4 Kgs
h) Mode of Packing	: Carton Box
i) Date of receipt	: 31.05.2023
j) Seal	: Un Sealed
k) LO's signature on the sample	: Un Signed
l) Test duration	: 22.08.2023 to 25.01.2024
m) Any other information: Interim Report No. 002987 Date. 25.01.2024	

PART- B: SUPPLEMENTARY INFORMATIONS

a) Reference to sampling procedure	: Sample submitted by Party
b) Supporting documents for the measurements taken and results derived	: As mentioned in Part C
c) Deviation from the test methods as prescribed in relevant ISS / Work instructions , if any	: Nil

केंद्रीय पेट्रोरसायन अभियांत्रिकी एवं पौघोगिकी संस्थान (सिपेट)
विजयवाडा, आंध्राप्रदेश

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CENTRAL INSTITUTE OF PETROCHEMICALS ENGINEERING & TECHNOLOGY (CIPET)
Vijayawada, Andhra Pradesh

No. : 000959

Test Report

Continuation Sheet

PART- C: TEST RESULTS AS PER IS: IS 17088:2021
Report No.: 002987(S)

Sl. No	Name of the test	Test Method/ Standard	Unit	Results Obtained	Specified Requirement
Sample details: Biodegradable & Compostable film as stated by the party					
1.	Material Identification	FTIR/DSC	--	Poly butylene adipate-co-terephthalate (PBAT) & Polylactic Acid (PLA)	--
2.	Disintegration (Dry mass remains in 2mm sieve after 84 days)	Cl. 6.2 of ISO 17088-2021	%	9.68	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	%	91.53 (at the end of 157 days)	> 90% (At the end of the test period not more than 180 days)
4.	Plant Growth study **Monocotyledon(Paddy)** % Seed emergence **Dicotyledon(Brinjal)** % Seed emergence	Cl. 6.4.3 of ISO 17088:2021 (Annex C)	% % %	92 92	> 90% of those from the corresponding blank compost

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

Test Report

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Continuation Sheet

PART- C: TEST RESULTS AS PER IS: IS 17088:2021 Page 3 of 4
Report No.: 002987(S)

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		%	97	
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		%	96	

केंद्रीय पेट्रोकेमिकल्स इंजीनियरिंग एवं तकनीकी संस्थान
विजयवाडा, आंध्राप्रदेश

CENTRAL INSTITUTE OF PETROCHEMICALS ENGINEERING & TECHNOLOGY
Vijayawada, Andhra Pradesh

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Continuation Sheet

PART- C: TEST RESULTS AS PER IS: IS 17088:2021 Page 4 of 4
Report No.: 002987(S)

Sl. No.	Property	Test method / Standard	Unit	Results obtained	Specified Requirements
7.	Heavy Metal Analysis				
	Arsenic (As)	Cl. 6.5.2 of ISO 17088:2021/Cl.4.3 of IS 17899 T:2022	mg / L	0.0334	10
	Copper (Cu)			1.5732	300
	Nickel (Ni)			0.6821	50
	Zinc (Zn)			1.2923	1000
	Chromium (Cr)			0.6723	50
	Mercury (Hg)			0.0102	0.15
	Cadmium(Cd)			1.2245	5
	Lead (Pb)			1.3654	100

PART -D : REMARKS: Nil

NB: 1. The results stated above relate only to the items tested.
2. This Test Certificate shall not be reproduced except in full without the written approval of the Laboratory.
3. Details of tests sub-contracted: Nil
4. This Test Report / Certificate is issued only for the samples submitted to CIPET.
5. The quality of the subsequent production lot has to be ensured by the purchaser.
6. Environmental Conditions of Laboratory: Temperature: 27 ± 2^0 C, Humidity: 65 ± 5 %
7. Statement of Conformity / Decision Rule: NA

END OF REPORT

Dr. Ch. Shekar
Authorized Signatory

केंद्रीय पेट्रोकेमिकल्स इंजीनियरिंग एवं तकनीकी संस्थान
विजयवाडा, आंध्राप्रदेश
CENTRAL INSTITUTE OF PETROCHEMICALS ENGINEERING & TECHNOLOGY
Vijayawada, Andhra Pradesh

Test Report

No.:

Continuation Sheet

ANNEXURE-I

000879

TR. NO.: 002987(S) ANALYSIS RESULT Date: 21.03.2024

OBSERVATION FOR BIODEGRADABILITY TEST AS PER ISO IS 17088:2021

Name of the Customer : M/S AICMT INTERNATIONAL PRIVATE LIMITED
Bharath's 63 North, Ground Floor, Aditya Gardens 3rd Lane,
Plot Number-63&64, Bachupally, Medchal, Malkajgiri , Pin 500090

1. Sample Detail: Compostable carry bags as stated by the party

2. Material Identification by FTIR & DSC: Poly (butylene adipate-co-terephthalate) (PBAT) & Poly Lactic Acid (PLA)

3. Observations : The average thickness of film sample was observed as 36.2 microns

a. Conditions of reaction Mixture

Origin of Compost	: Livestock excrement, municipal and vegetable waste
Reaction Temperature	: 58°C (±2°C)
Dry Solid (%)	: 55.13%
Volatile content (%)	: 37.85%
CO_2 evolved during 1st 10 days in blank vessels	: 53.12 mg/g of volatile solids of compost
Test Duration (Days)	: 157 days
Reference material	: Cellulose
Volume of reaction Vessel	: 3000 ml

Test Report

No.: 000879

Continuation Sheet

TR. NO.: 002987(S) ANALYSIS RESULT Date: 21.03.2024

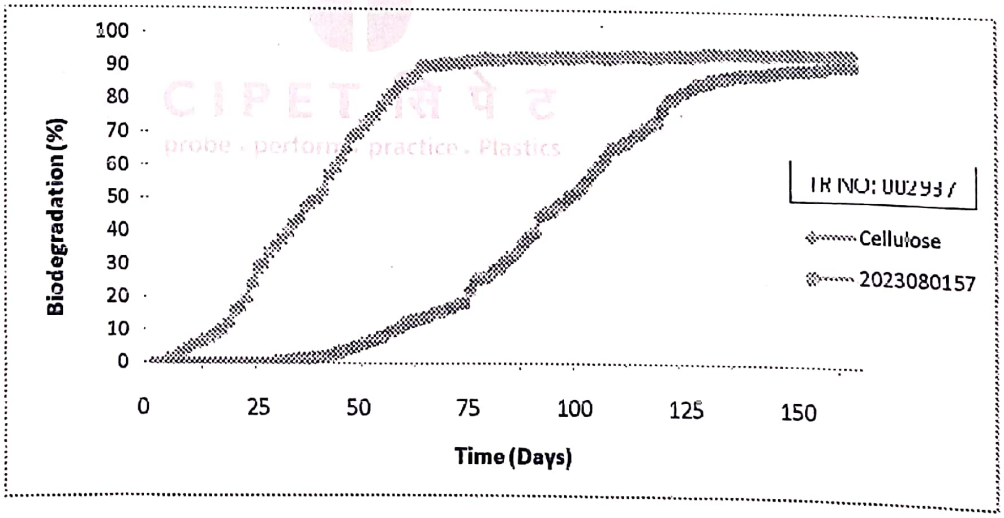
b. pH of test medium

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	7.3
4	Blank	7.5	7.1
5	Positive 1	7.5	7.1
6	Positive 2	7.5	7.2
7	Positive 3	7.5	7.2
8	Negative	7.5	7.2

4. Result: Percentage biodegradation relative to positive reference

Mean (%) : 91.53%

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



Test Report

No.:

Continuation Sheet

000879
TR. NO.: 002987(S)

ANALYSIS RESULT

5. Visual observation of Sample

Description	Week 1	Week 5	Week 10	Week 15	Week 20
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

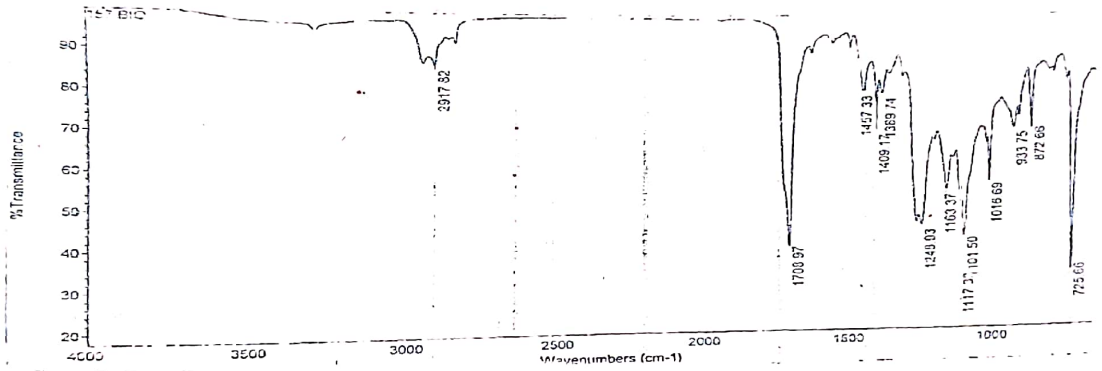
Description	Week 1	Week 5	Week 10	Week 15	Week 20
Structure	Fine Particles	Fine Particles	Fine Particles	Fine Particles	Fine Particles
Moisture	Adequate moisture level	Adequate moisture level	Adequate moisture level	Adequate moisture level	Adequate moisture level
Colour	Dark brown	Dark brown	Dark brown	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

Test Report

No.: 000879 Continuation Sheet Page 4 of 6

TR. NO.: 002987(S) ANALYSIS RESULT Dt. 21.03.2024

7. FTIR Analysis

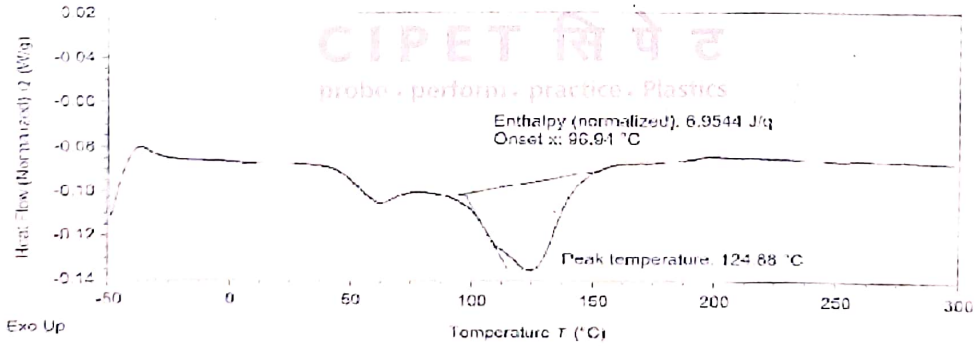


Sample Details:

Wavenumber(cm^{-1})	Nature of Bond
2918.20	C-H stretching vibration
1710.75	C=O stretching vibration
1407.34	C=C stretching vibration
1267.05	C-O stretching vibration
726.38	C=C bending vibration

8. DSC Analysis

23122929-C



Comment: The above DSC & FTIR analysis indicates the above sample Poly (butylene adipate-co- terephthalate) (PBAT) & Poly Lactic Acid (PLA)

Test Report

No.: 000879

TR. NO.: 002987(S) **ANALYSIS RESULT** **Dt. 21.03.2024**

9. DISINTEGRATION- AFTER 12 WEEKS

TR NO: 2987S

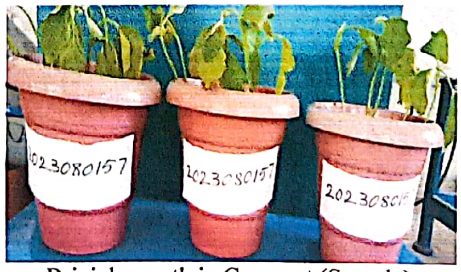
The disintegration of the supplied sample by passing through 2 mm sieve after 12 week in composting condition as per ISO 17088: 2021 was found not more than 10% of original dry mass remain.

10. SEED GERMINATION AND PLANT GROWTH STUDY

Paddy growth in Compost (Control)

Paddy growth in Compost (Sample)

Brinjal growth in Compost (Control)



Brinjal growth in Compost (Sample)

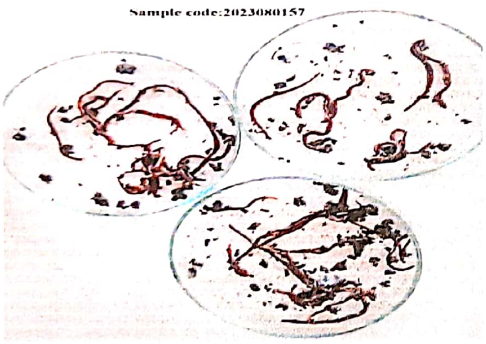
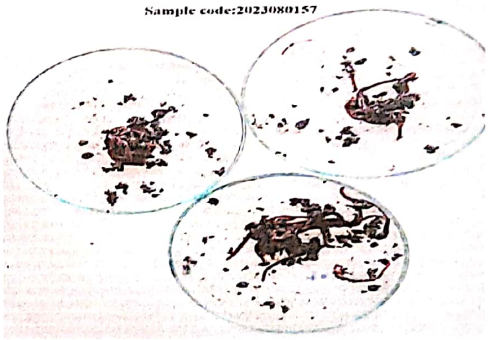
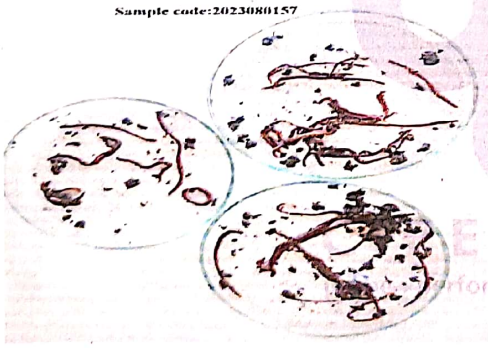
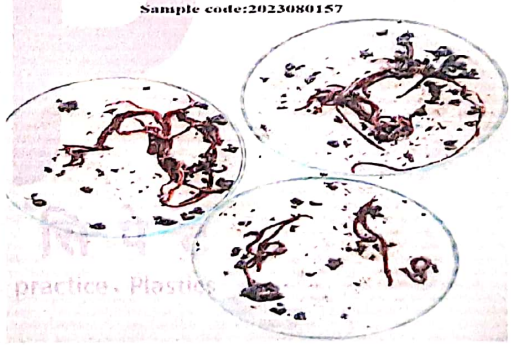
The percentage of seed germination was found to be greater than 90% for both control and sample.

Test Report

No.: 000879 Continuation Sheet Page 6 of 6

TR. NO.: 002987(S) ANALYSIS RESULT Dt.21.03.2024

11. Acute & Chronic Eco toxicity effects to Earthworm

 Photograph of Live earthworm in the sample compost at the end of 7 days	 Photograph of Live earthworm in the sample compost at the end of 14 day
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	
 Photograph of Live earthworms in the sample compost at the end of 28 days	 Photograph of Live earthworms in the sample compost at the end of 56 days
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.	