सिपेट : स्कूल फार एडवांस्ड
रिसर्च इन पेट्रोकेमिकल्स् (एस. ए. आर. पी)
एडवांस्ड पॉलीमर डिसैन रिसर्च & डेवेलपमेन्ट
रिसर्च लॉबोरेटोरी, (ए.पी.डी.डी.आर.एल)
रसायन एवं पेट्रोरसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार
प्लॉट नंबर : ७ पि, हार्ट टेक रक्ष और एयरोस्पेस पार्क
(आईटी सेक्टर), जलाहोवली, बेंगलुरू - 562149
ई-मेल : apddrl@cipet.gov.in
मुख्यालय : सिपेट, गिंडी, चेन्नै - **600032**

सिपेट CIPET

CIPET : SCHOOL FOR ADVANCED RESEARCH IN PETROCHEMICALS (SARP)- ADVANCED POLYMER DESIGN & DEVELOPMENT RESEARCH LABORATORY (APDDRL)
Dept. of Chemicals & Petrochemicals,
Ministry of Chemicals & Fertilizers, Govt. of India
Plot No. 7P. Hi Tech Defence and Aerospace Park
(IT Sector), Jala Hobli, Bengaluru - 562 149
E-mail : apddrl@cipet.gov.in
Head Office : CIPET, Guindy, Chennai - 600032

CERTIFICATE OF ANALYSIS AS PER ISO 17088:2021

CIPET/SARP-APDDRL/Testing/2025-26/ **Date: 11.02.2026**

To,

M/s Fortune Enterprises,
No:39,40,42,43 1st main 2nd cross,
Kambipura, Bangalore-74

Sub: Test Report- Reg.

Ref. No: **1) Mail dtd 25.07.2025**
2) Interim report no: 250545 dated 12.12.2025

Dear Sir,

With reference to the above, the submitted sample was analyzed as per ISO 17088:2021.The summary detail of testing & analysis is given below:

Company Name & Address	**: M/s Fortune Enterprises, No:39,40,42,43 1st main 2nd cross, Kambipura, Bangalore-74**
Test Standard	**: ISO 17088:2021**
Sample Details	**: "Compostable Carry Bag"** - As stated by the party
Test Report No	**: 250545 (Final) & dated 09.02.2026**
Date of Receipt of sample	**: 28.07.2025**
Date of Initiation	**: 01.08.2025**
Date of Completion	**: 30.11.2025**
Percentage of compostability	**: 92.71% in 121 days**
Requirement of Compostability in 180 days as ISO 17088:2021	**: 90 %**

The sample submitted by **M/s Fortune Enterprises,** is compostable and the percentage of compostability in **121**days reported vide test report No.**250545** is **92.71%**

The submitted sample also complies with the terms of Compostability, Seed germination and Disintegration as per ISO 17088:2021

Thanks & Regards,

11.02.2026

Authorized Signatory
Encl : Analysis Report

सिपेट : स्कूल फार एडवांस्ड
रिसर्च इन पेट्रोकेमिकल्स् (एस. ए. आर. पी)
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रसायन एवं पेट्रोरसायन विभाग
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सिपेट CIPET

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(IT Sector), Jala Hobli, Bengaluru - 562 149
E-mail : apddrl@cipet.gov.in
Head Office : CIPET, Guindy, Chennai - 600032

ANALYSIS REPORT

Report No: 250545 (Final)
Date: 11.02.2026

Issued to

M/s Fortune Enterprises,
No:39,40,42,43 1st main 2nd cross,
Kambipura, Bangalore-74

Ref. No: **1) Mail dtd 25.07.2025**
2) Interim report no: 250545 dated 12.12.2025

PART A: PARTICULARS OF SAMPLE SUBMITTED

a) Name of the Sample	: "Compostable Carry Bag" As stated by the party
b) Grade/variety/Type/Size/Class etc.	: Film Sample – as supplied by the party
c) Code No.	: NA
d) Quantity (pcs./mtr/gm/nos)	: 1.5 kg.
e) Mode of packing (Sealed carton/Polypouch/Container or not)	: Polypouch
f) Date of receipt of sample	: 28.07.2025
g) Date of Performance of test	: 01.08.2025 to 30.11.2025
h) Any other information	: NIL

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-	: Nil

11.02.2026 11.02.2026

सिपेट : स्कूल फार एडवांस्ड
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रिसर्च लॉबोरेटोरी, (ए.पी.डी.डी.आर.एल)
रसायन एवं पेट्रोरसायन विभाग
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सिपेट CIPET

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ANALYSIS REPORT

PART-C					
Test Result					
Sl. No.	**Name of test**	**Test Method**	**Unit**	**Test Result**	**Specified requirements**
01	Material Identification	FTIR / DSC	--	PBAT Based Material	--
02	Disintegration (Dry mass remains in 2mm sieve after 84 days)	Cl. 6.2 of ISO 17088 : 2021	%	8.7	Not more than 10
03	Ultimate aerobic Biodegradation (with reference to 100% degradation of positive reference)	Cl. 6.3 of ISO 17088 : 2021	%	92.71 (At the end of 121 days)	>90% (At the end of the test period not more than 180 days)
04	Plant Growth study **Monocotyledon** % Seed emergence **Dicotyledon** % Seed emergence	Cl 6.4.3 ISO 17088 : 2021	 % %	 92.89 93.44	 >90 >90
05	**Acute Ecotoxic Effects of Earthworm**				
a	Survival of adult earthworm at the end of 7 days	Cl.No.6.4.4 of ISO 17088 : 2021	%	100	Shall be more than 90
b	Survival of adult earthworm at the end of 14 days		%	99	Shall be more than 90
c	Biomass end of the 14 days		%	97	Shall be more than 90
06	**Chronic ecotoxic effects to earthworm**				
a	Survival of adult earthworm at the end of 28 days	Cl.No.6.4.5 of ISO 17088 : 2021	%	98	Shall be more than 90
b	Offspring at the end of 56 days		%	96	Shall be more than 90
c	Biomass end of the 56 days		%	97	Shall be more than 90

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

11.02.2026 11.02.2026

सिपेट : स्कूल फार एडवांस्ड
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सिपेट CIPET

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ANALYSIS REPORT

Report No: 250545(Final)
Date: 11.02.2026

Sl. No	Name of the Test	Test Method/Standard	Unit	Specified Requirements	Results Obtained
07.	**Heavy metals concentration**				
	Arsenic (As)	AAS Method	ppm	10	0.0035
	Copper (Cu)			300	0.0842
	Nickel (Ni)			50	0.0864
	Zinc (Zn)			1000	1.2581
	Chromium (Cr)			50	0.0357
	Molybdenum (Mo)			--	0.0009
	Mercury (Hg)			0.15	BDL
	Cadmium (Cd)			5	0.0176
	Lead (Pb)			100	0.0629
	Selenium (Se)			--	0.0008

*BDL-Below Detection Limit
Based on solid waste management Rules, 2016 notified on 8th April 2016 by Ministry of Environment and Forests, Government of India.

PART D: REMARKS: NIL

Note:

1. This Test Report / Certificate is issued only for the samples submitted to CIPET: SARP-APDDRL.
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 CIPET: SARP-APDDRL within 30 days from the date of issue.
6. Sub contracted Tests (if any): NIL

11.02.2026
Reviewed By
Dr. V H Sangeetha
Scientist

11.02.2026
Authorized By
Dr. Manoranjan Biswal
Sr. Scientist

--- End of the Report---

TR.NO. –250545 (Final) **ANALYSIS RESULT** **Date: 11.02.2026**

OBSERVATION FOR BIODEGRADABILITY TEST AS PER ISO 17088:2021

To,

M/s Fortune Enterprises,
No:39,40,42,43 1st main 2nd cross,
Kambipura, Bangalore-74

Date of Initiation : **01.08.2025**
Date of Completion : **30.11.2025**
1.Sample detail : **"Compostable Carry Bag"**-As stated by the party
2.Material Identification by DSC & FTIR : DSC & FTIR graph indicates that the supplied material is **PBAT Based Material**.

3.Observation: -

a. Conditions of reaction mixtures

Origin of compost:	: Livestock excreta, municipality waste and vegetable waste
Reaction Temperature	: 58 °C (± 2°C)
Dry Solid	: 52.08(%)
Volatile Solid	: 30.17(%)
Test duration	: 180 days (Under compost condition)
Reference material	: Cellulose
Volume of reaction vessel	: 3000 ml

b. p^H of test medium:-

Composting Vessel	p^H (Before Test)	p^H (After Test)
Blank 1	7.1	7.2
Blank 2	7.2	7.3
Blank 3	7.2	7.3
Cellulose1	7.3	7.4
Cellulose2	7.4	7.5
Cellulose3	7.4	7.5
Negative 1	7.3	7.4
Negative 2	7.4	7.5
Negative3	7.2	7.3
Sample 1	7.6	7.7
Sample 2	7.5	7.6
Sample 3	7.5	7.6

11.02.2026

Reviewed By
Dr. V H Sangeetha
Scientist

11.02.2026

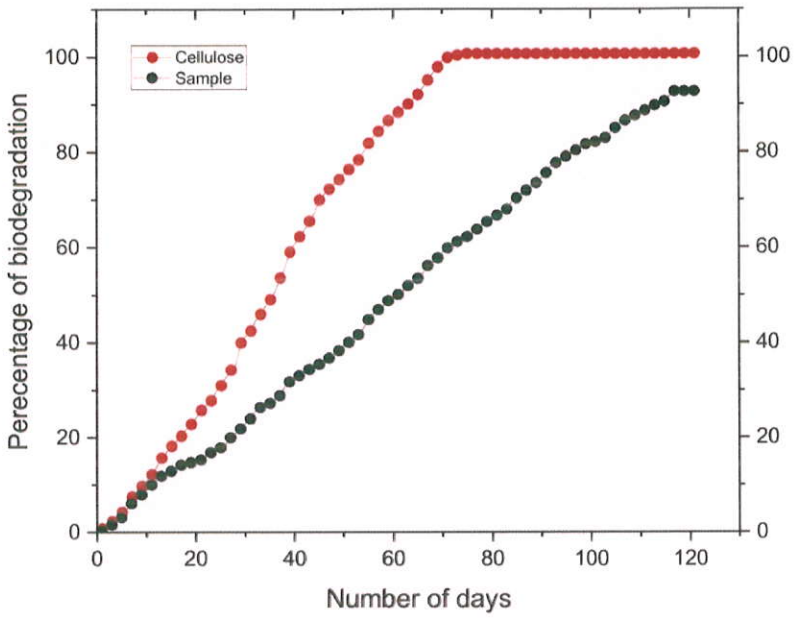
Authorized By
Dr. Manoranjan Biswal
Sr. Scientist

TR.NO. – 250545(Final) **ANALYSIS RESULT** Date: 11.02.2026

1. Result: Percentage biodegradation relative to positive reference

MEAN (%) : **92.71**

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



2. Visual Observation:-

	Week 1	Week 2	Week 3	Week 4	Week 5
Structure	Film sample	Film sample	Film sample	Film sample	Film sample
Moisture	Appropriate moisture level	Appropriate moisture level	Appropriate moisture level	Appropriate moisture level	Appropriate moisture level
Color	Milky White	Milky White	Milky White	Milky White	Milky White
Fungal Development	None	None	None	None	None
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like	Organic/dirt like	Organic/dirt like

11.02.2026

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Scientist

11.02.2026

Authorized By
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Sr. Scientist

	Week 6	Week 7	Week 8	Week 9	Week 10
Structure	Film sample	Film sample	Film sample	Film sample	Disintegration initiated
Moisture	Appropriate moisture level	Appropriate moisture level	Appropriate moisture level	Appropriate moisture level	Appropriate moisture level
Color	Milky White	Milky white	Milky white	------	------
Fungal Development	None	None	None	None	None
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like	Organic/dirt like	Organic/dirt like

	Week 11	Week 12	Week 13	Week 14	Week 15
Structure	Disintegration Observed	Disintegration Observed	Disintegration Observed	Disintegration Observed	Disintegration Observed
Moisture	Appropriate moisture level	Appropriate moisture level	Appropriate moisture level	Appropriate moisture level	Appropriate moisture level
Color	-------	---------	-------	---------	---------
Fungal Development	None	None	None	None	None
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like	Organic/dirt like	Organic/dirt like

	Week 16	Week 17	Week 18
Structure	Disintegration Observed	Disintegration Observed	Disintegration Observed
Moisture	Appropriate moisture level	Appropriate moisture level	Appropriate moisture level
Color	-------	---------	-------
Fungal Development	None	None	None
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like

11.02.2026

Reviewed By
Dr. V H Sangeetha
Scientist

11.02.2026

Authorized By
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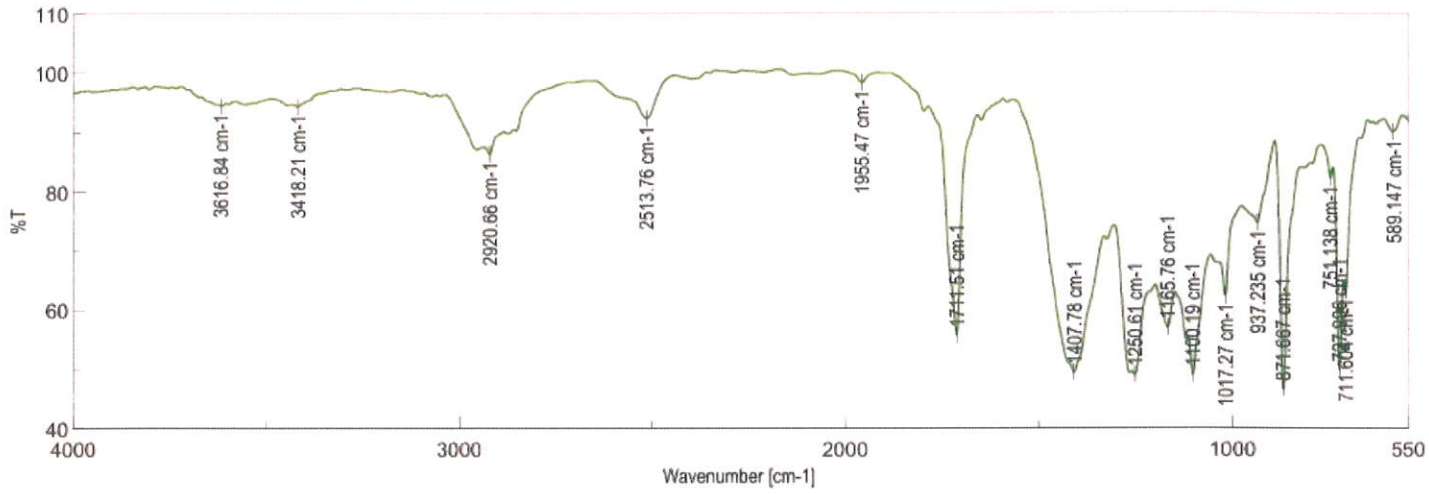
Sr. Scientist

3. FTIR Analysis:



Wave number (cm^{-1})	Possible Nature of Bond
2920.66	C–H stretching
1711.51	-C=O stretching
1407.78	– CH bending
1250.61 – 1165.76	C-O-C stretching
1017.27	C–O stretching
871.667,589.147,727.906	Out plane bending =CH in benzene ring

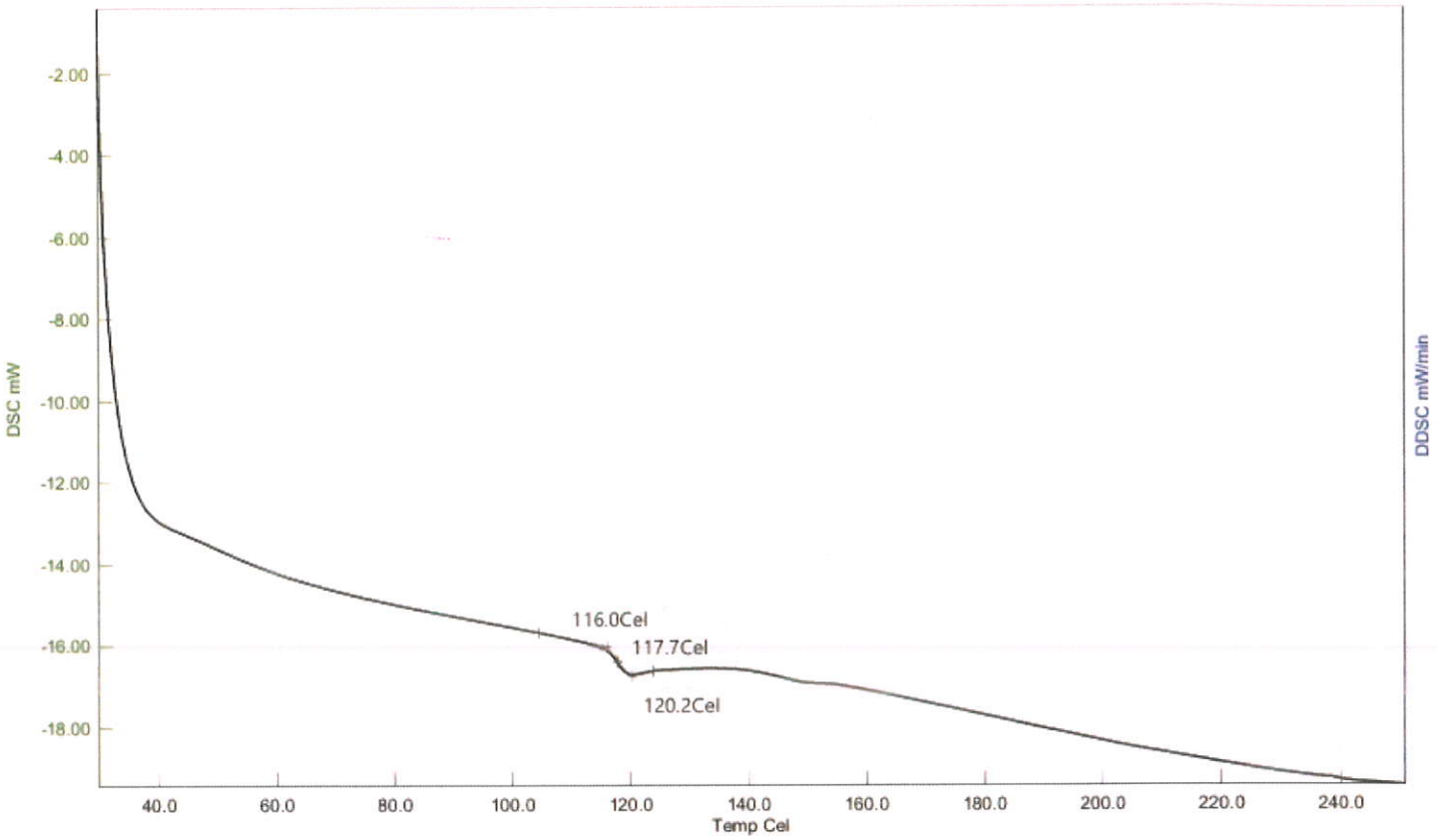
11.02.2026

Reviewed By
Dr. V H Sangeetha
Scientist

11.02.2026

Authorized By
Dr. Manoranjan Biswal
Sr. Scientist

7. **DSC Analysis**:-



Comment: DSC & FTIR graph indicates that the supplied material is **PBAT Based Material.**

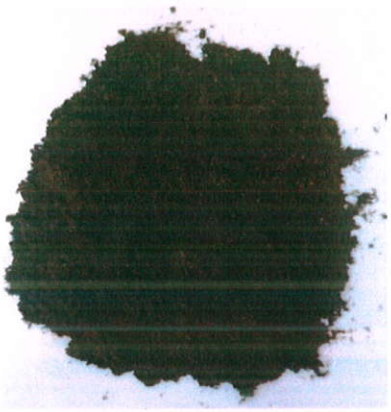
11.02.2026

Reviewed By
Dr. V H Sangeetha
Scientist

11.02.2026

Authorized By
Dr. Manoranjan Biswal
Sr. Scientist

8. Disintegration- After 12 Weeks

BEFORE DISINTEGRATION	AFTER DISINTEGRATION
250754	**250754**
	
BEFORE DISINTEGRATION	**AFTER DISINTEGRATION**

Comments:-

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

11.02.2026

Reviewed By
Dr. V H Sangeetha
Scientist

11.02.2026

Authorized By
Dr. Manoranjan Biswal
Sr. Scientist

9. Germination and Plant Growth Study(250754)

	
Wheat Compost (Control)	**Wheat Compost (Sample)**

	
Mung Bean Compost (Control)	**Mung Bean Compost (Sample)**

The percentage of seedling germination rate was found to be greater than 90% for both Wheat and Mung Bean.

11.02.2026

Reviewed By
Dr. V H Sangeetha
Scientist

11.02.2026

Authorized By
Dr. Manoranjan Biswal
Sr. Scientist