

सिपेट : इंस्टीट्यूट ऑफ प्लास्टिक्स
टेक्नोलॉजी (आई.पी.टी.)



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PLASTICS TESTING CENTRE

Series : I ANALYSIS REPORT

TEST CERTIFICATE

S.L. No. 774

Issued to : Auravail Biopolymer India Pvt. Ltd-Pune
H No. 1019, Santosh Nagar, Wadki BK,
Ta. Kheda, Dist. Pune
Pune -410 501
Phone No. 9028790053
E-mail - piyush@auravail.com

Test Report No : 946

Dated : 12.04.2021

Your Ref. No. : NIL

Dated : 13.06.2020

Test Report as per Standard : As per part C

PART A

ULR No. TC81642100000097P

PARTICULARS OF SAMPLE SUBMITTED

- | | |
|---|---------------------------------|
| a) Name of the sample(as stated by the party) | : Film Tube Opaque White Sample |
| b) Grade/Variety/Type/Size/Class etc. | : --- |
| c) Code No. | : --- |
| d) Quantity (pcs/mtr/gm/nos) | : 1.5 kg. |
| e) Mode of packing
(Sealed carton/poly pouch/container or not) | : Individual Packs |
| f) Date of receipt of sample | : 25.06.2020 |
| g) Date of Performance of test | : 28.08.2020 |
| h) Any other information | : --- |

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 | : Not Applicable |

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Date : 12.04.2021

PART C
TEST RESULTS

Sr. No.	Name of the Test	Test Method/Standard	Unit	Results obtained	Specified Requirements
Sample Details : Film tube opaque white sample (As stated by the party)					
1.	Material Identification	FTIR/DSC	--	Blends of PLA/PBAT	-----
2.	Disintegration(Dry mass passing through 2 mm sieve after 84 days)	IS 17088:2008	%	9.0	Not more than 10%
3.	Ultimate aerobic Biodegradation (with reference to 100% degradation of positive reference)	IS 17088:2008	%	92.15	>90 (At the end of the test period not more than 180 days)
4.	Plant growth study Monocotyledon(Rice) % Seed emergence	IS 17088:2008	%	92.5	>90
	Dicotyledon(Tomato) % Seed emergence		%	95.0	>90

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

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PART C
TEST RESULTS

Sr no	Name of the Test	Test Method/Standard	Unit	Results obtained	Specified requirements
5.	Heavy metals concentrations #	ISO 17088:2012/ IS 17088:2008	Mg/l		
i.	Arsenic (As)			0.057	20
ii.	Copper (Cu)			2.30	500
iii.	Nickel (Ni)			B.L.Q (Q.L=0.05)	100
iv.	Zinc (Zn)			B.L.Q (Q.L=0.05)	2500
v.	Cobalt (Co)			B.L.Q (Q.L=0.05)	----
vi.	Chromium (Cr)			4.35	300
vii.	Molybdenum (Mo)			B.L.Q (Q.L=0.05)	----
viii.	Mercury (Hg)			B.L.Q (Q.L=0.05)	10
ix.	Cadmium (Cd)			B.L.Q (Q.L=0.05)	20
x.	Lead (Pb)			0.66	500
xi.	Selenium (Se)			B.L.Q (Q.L=0.05)	----

*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): # Gujarat Laboratory

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PLASTICS TESTING CENTRE

ANALYSIS REPORT

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Annexure-I

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

Customers Details:

Name of the Party : Auravail Biopolymer India pvt.ltd- pune

Sample Details: Film tube opaque white sample (As declared by the party)

1 Material Identification by FTIR & DSC : Blends of Polylactic Acid(PLA) /
Polybutyleneadipate Co-terephthalate (PBAT)

2 Observation:-

- a) Conditions of reaction mixtures
Origin of Compost : Livestock excreta, municipal and vegetable waste
Reaction Temperature : 58° (±2°C)
Dry Solid : 50.6 %
Volatile Solid : 39.1 %
CO₂ evolved during 1st 10 days
in blank vessels : 50.06 mg/g of volatile solids of compost
Test Duration : 144 Days.
Reference Material : Cellulose.
Volume of reaction vessel : 3000ml.
- b) pH of Test medium

Sl. No.	Composting Vessel	pH (before test)	pH (after test)
1	Blank 1	8.3	7.6
2	Blank 2	8.5	8.1
3	Blank 3	8.0	7.9
4	Cellulose 1	8.1	7.9
5	Cellulose 2	8.0	7.5
6	Cellulose 3	7.8	8.5
7	Negative 1	7.6	7.1
8	Negative 2	7.8	8.2
9	Negative 3	7.4	7.5
10	Sample 1	7.3	8.1
11	Sample 2	8.0	7.6
12	Sample 3	8.3	8.0

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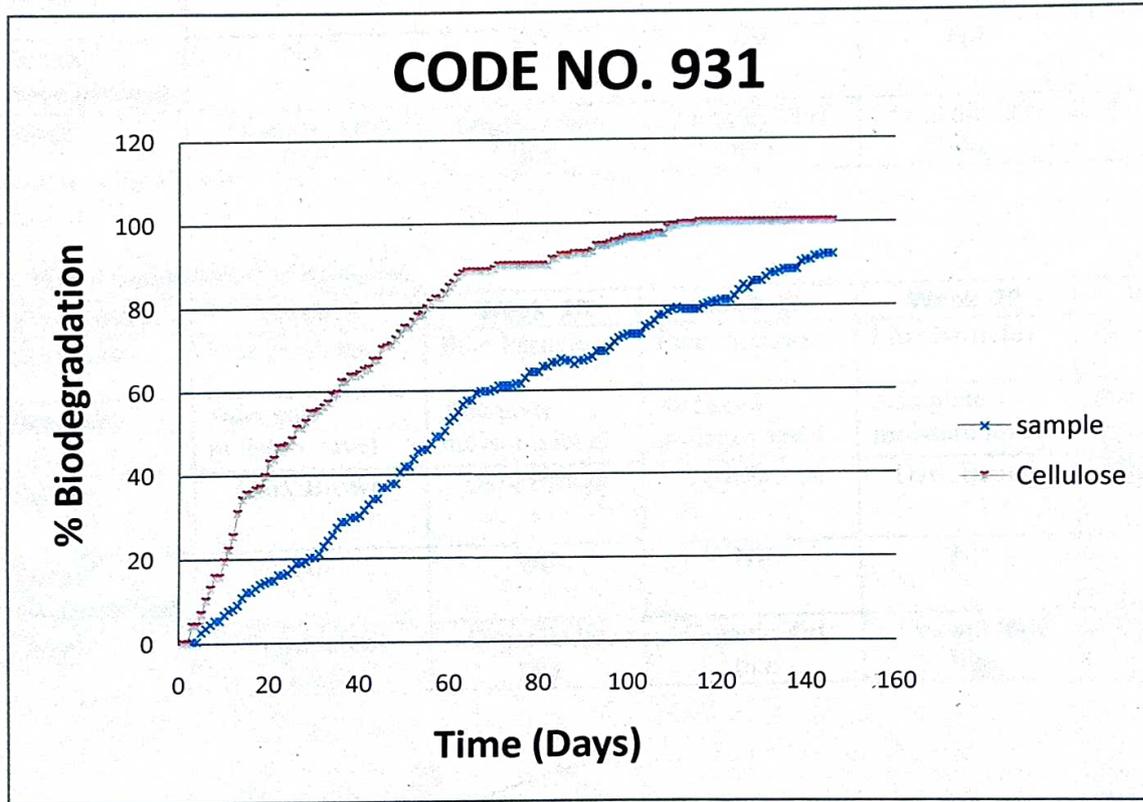
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4. Result: Percentage biodegradation relative to positive reference

MEAN (%) : 92.15%

The reference material- Cellulose (%) : 100%



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5. Visual Observation of Sample

Description	Week 5	Week 10	Week 15	Week 20	Week 21
Structure	Film sample				
Moisture	Adequate moisture level				
Colour	Milky white	Milky white	Milky white	Faded white	----
Fungal Development	Nil	Nil	Nil	Nil	Nil
Smell	Organic /dirt like				

6. Visual Observation of Compost

Description	Week 5	Week 10	Week 15	Week 20	Week 21
Structure	Fine Particles				
Moisture	Adequate moisture level				
Colour	Dark Brown				
Fungal Development	Nil	Nil	Nil	Nil	Nil
Smell	Organic/dirt Like				

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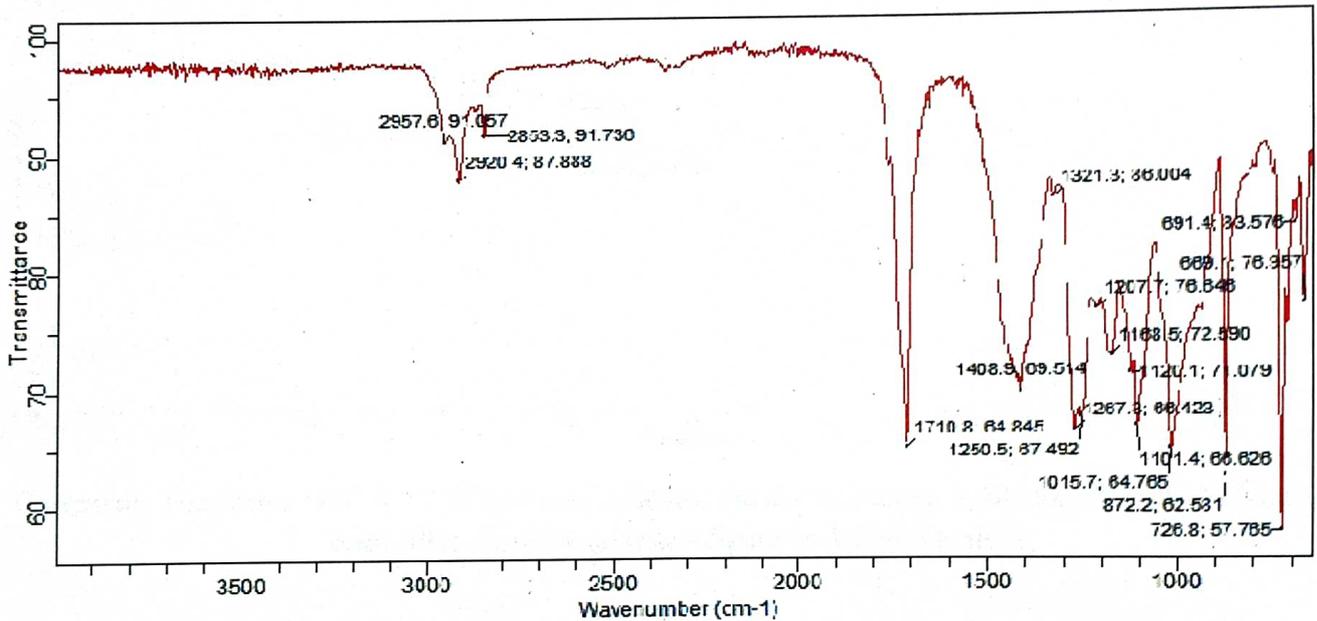
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6. FTIR Analysis

Sample Details : Film tube opaque white sample (As declared by the party)



Wave number (cm ⁻¹)	Nature of Bond
1) 2920.4	C - H Stretching vibrations
2) 1408.9	O - H Bending vibrations
3) 1250.5	C - O Stretching vibrations
4) 872.2	C - H Bending vibrations
5) 1101.4	C - O Stretching vibrations

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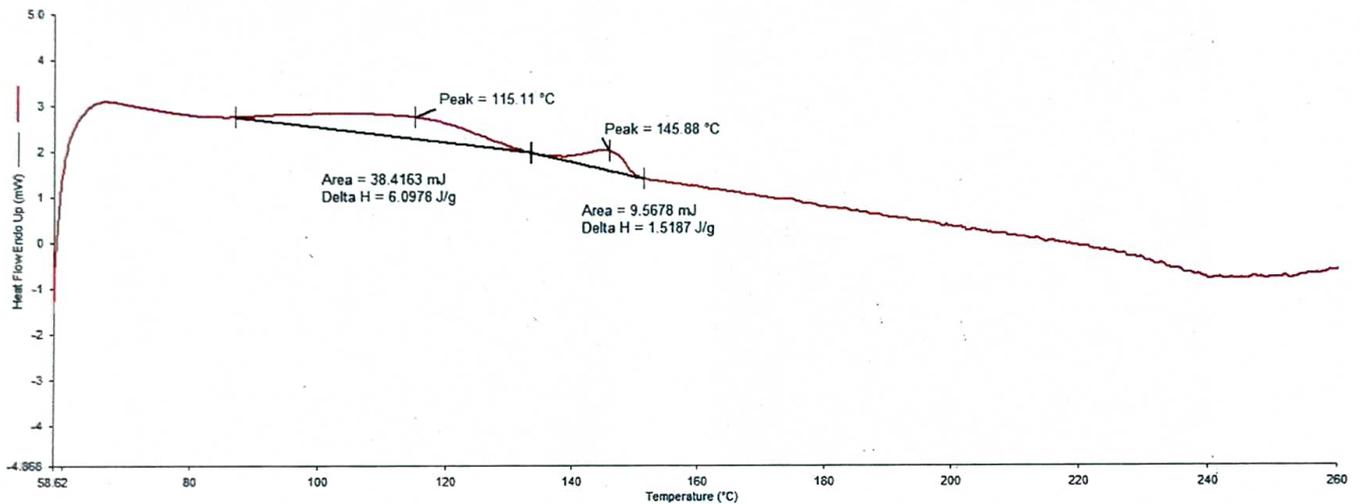
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7. DSC Analysis



Comment: The above DSC & FTIR analysis indicates the above sample is Blends of PLA (Polylactic acid) /PBAT (PolybutyleneAdipate co-terephthalate)

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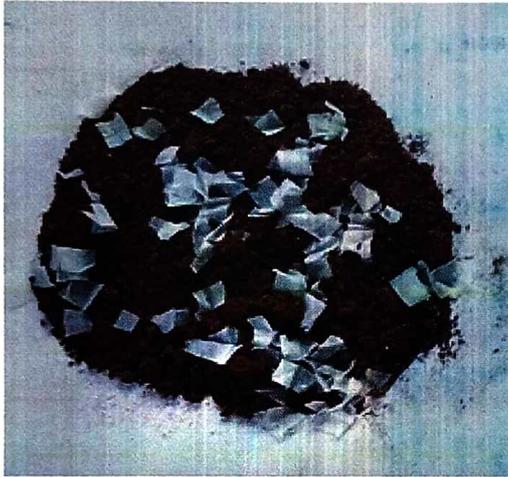
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8.DISINTEGRATION - AFTER 12 WEEKS



BEFORE DISINTEGRATION



AFTER DISINTEGRATION

The disintegration of the 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.

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PLASTICS TESTING CENTRE

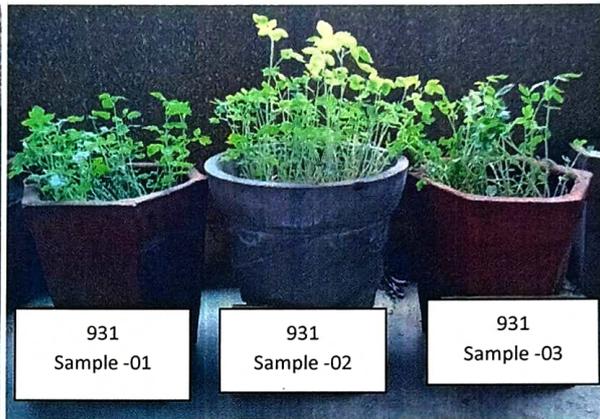
ANALYSIS REPORT

Report No.: 946
Date : 12.04.2021

9. GERMINATION AND PLANT GROWTH STUDY



931 Compost (Control)



931 Compost (Sample)



931 Compost (Control)



931 Compost (Sample)

The percentage of seed germination rate is found to be greater than 90% for both Monocotyledon and Dicotyledon.

Rajeev pande
AUTHORISED SIGNATORY

[Signature]
AUTHORISED SIGNATORY

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