

परीक्षण रिपोर्ट
TEST REPORT

को जारी / Issued to :

M/s. Bhavani Plastics,
No. 38, Murugan Koil Street,
Vanasakthi Nagar, Kolathur,
Chennai - 600 099.

क्र.सं / Sl. No. **21039**

रिपोर्ट सं / REPORT NO. : **57697**

Pages...**3**.....Nos. Part A,B,C & D

दिनांक / Date : **24.05.2019**

संदर्भ / Ref. : **Dated: 04.07.2018**

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

भाग - क / PART - A

प्रस्तुत सैपिल का विवरण / PARTICULARS OF SAMPLE SUBMITTED

अ) सैपिल का नाम / a) Name of the Sample	:	Bio-Compostable Film Sample -as stated by the party
आ) सैपिल प्राप्त होने की तारीख / b) Date of Receipt of sample	:	05.07.2018
इ) ग्रेड/प्रकार/आकार/वर्ग / c) Grade / variety / type / size / class	:	Not applicable
ई) घोषित मूल्य / d) Declared value, If any	:	Not applicable
उ) कोड सं. / e) Code No.	:	Not applicable
ऊ) बैच सं. एवं निर्माण तारीख / f) Batch No. and Date of Manufacture:	:	Not applicable
ऋ) मात्रा / g) Quantity	:	1.5 Kg
ए) पैकिंग की रीति / h) Mode of Packing	:	Not Packed
ऐ) मोहर बंद या नहीं / i) Sealed or not	:	Not Sealed
ओ) कोई अन्य सूचना / j) Any other information	:	--

भाग - ख / PART - B

अनुपूरक सूचनाएँ / SUPPLEMENTARY INFORMATIONS

अ) सैपिलिंग 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

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भाग - ग / PART - C

परीक्षण परिणाम / TEST RESULTS

Test Duration: 05.07.2018 to 24.05.2019

Sl.No.	Property	Standard	Unit	Results obtained	Specified Requirements
1.	Material Identification by FTIR	--	--	Blend of Poly Lactic Acid (PLA) and Poly Butylene Adipate co-terephthalate (PBAT)	--
2.	Disintegration (Dry mass passing through 2mm sieve after 84 days)	ISO-17088 / IS-17088	%	91.9	Greater than 90
3.	Ultimate Aerobic Biodegradation (with reference to 100% degradation of positive reference)	ISO-17088 / IS-17088	%	91.11	Greater than 90
4.	Plant Growth study a) Rice % Seed emergence	ISO-17088 IS-17088	%	92	Greater than 90
	b) Tomato % Seed Emergence		%	92	Greater than 90

(Contd...)



TEST RESULTS

Report No: **57697**

Date: **24.05.2019**

Sl. No.	Property	Standard	Unit	Results obtained	Specified Requirements (In India)*
5.	Heavy metals concentration	ISO-17088 / IS-17088	ppm		
	Arsenic (As)			0.019	20
	Copper (Cu)			1.61	500
	Nickel (Ni)			0.797	100
	Zinc (Zn)			4.01	2500
	Cobalt (Co)			0.285	--
	Chromium (Cr)			1.03	300
	Molybdenum (Mo)			0.041	--
	Mercury (Hg)			BDL (DL:0.01)	10
	Cadmium (Cd)			0.010	20
	Lead (Pb)			0.211	500
	Fluorine (F) as Fluoride			662	--
	Selenium (Se)			0.018	--

Note: BDL – Below Detection Limit, DL – Detection Limit

*-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, fluorine and selenium is not mentioned in the notification.

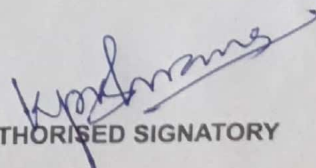
PART - D

REMARKS - Nil

NOTE:

1. The results related only to the items tested as supplied by the party.
2. The test certificate shall not be reproduced in full except without the written approval of the laboratory.

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AUTHORISED SIGNATORY



BIODEGRADABILITY TEST AS PER IS/ISO 17088

1. Sample detail: Compostable film samples

2. Observation

(1) Conditions of reaction mixtures

Origin of compost: Livestock excrement, municipal and vegetable waste
Reaction Temperature : 58⁰C (± 2⁰C)
Dry Solid (%) : 53.2
Volatile content (%) : 33.8
CO₂ evolved during first 10days in blank vessels : 56.1 mg/g of volatile content of compost
Test duration (day) : 132 days
Reference material : Cellulose
Volume of reaction vessel : 3000 ml

(2) pH of test medium

S. No.	Composting Vessel (Material with test medium)	pH (before)	pH (after)
1	Sample 1	7.5	7.4
2	Sample 2	7.5	7.2
3	Sample 3	7.5	7.3
4	Blank	7.5	7.4
5	Cellulose 1	7.5	7.3
6	Cellulose 2	7.5	7.3
7	Cellulose 3	7.5	7.2
8	Negative	7.5	7.5





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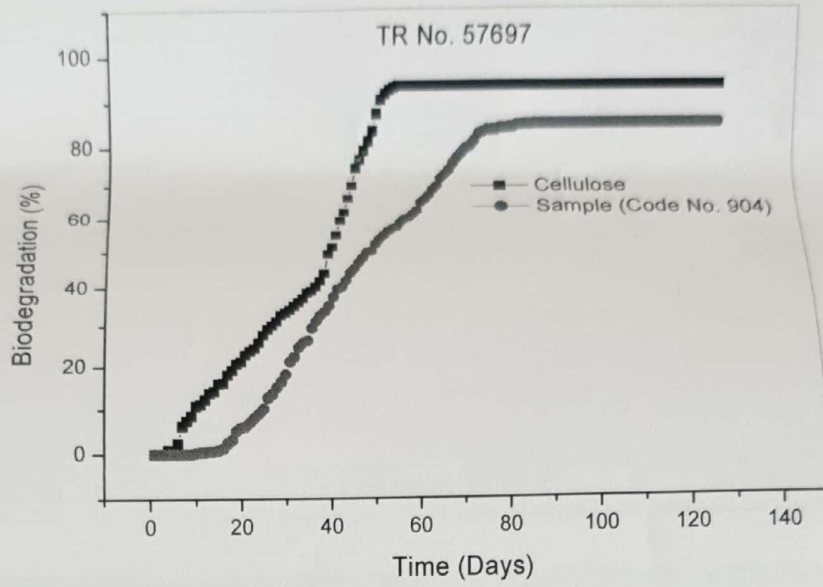
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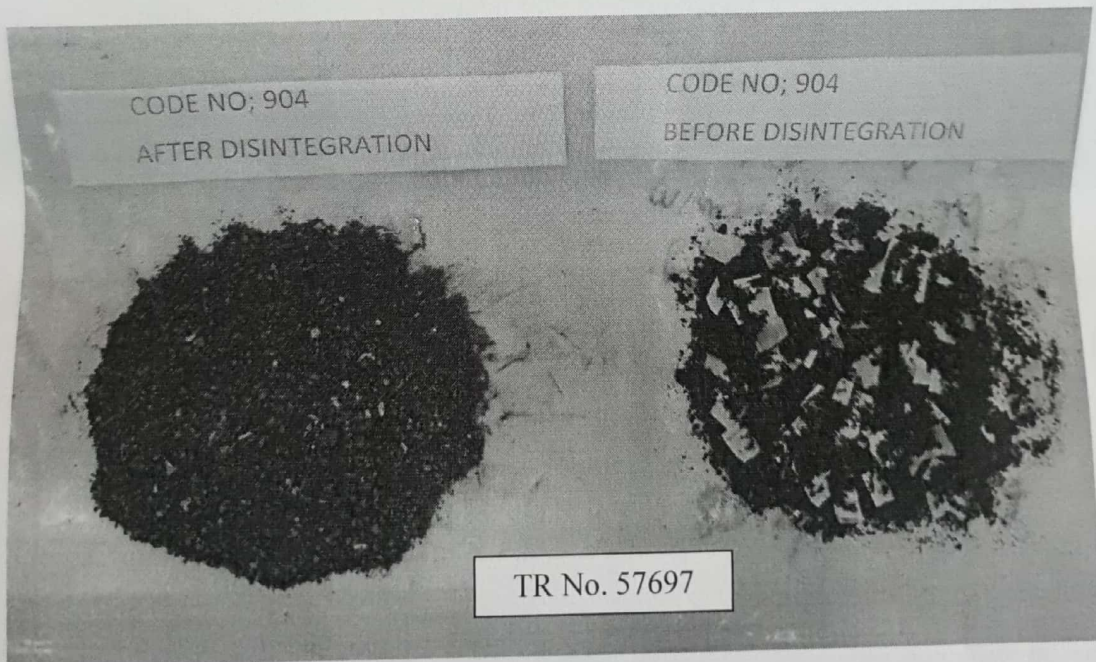


3. Result:

Percentage biodegradation relative to positive reference
Sample (Mean of 3 replicates) : 91.11%
Positive reference cellulose : ~ 100 %



4. Disintegration- After 12 weeks



5. Visual Observation

Description	Week 1	Week 2	Week 3	Week 4/5	Week 6/7
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

Description	Week 8/9	Week 10/11	Week 12/13
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 8/9	Week 10/11	Week 12/13	Week 14/15
Structure	Fine Particles	Fine Particles	Fine Particles	Fine Particles
Moisture	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level
Colour	Dark brown	Dark brown	Dark brown	Dark brown
Fungal Development	Nil	Nil	Nil	Nil
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like	Organic/dirt like

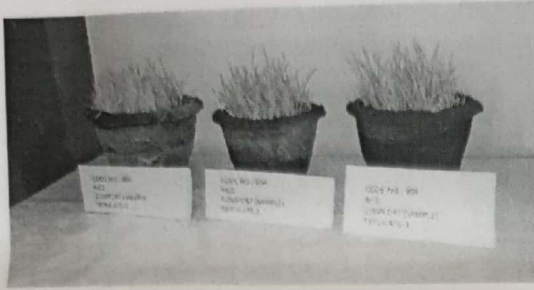
Description	Week 16/17	Week 18
Structure	Fine Particles	Fine Particles
Moisture	Adequate moisture Level	Adequate moisture Level
Colour	Dark brown	Dark brown
Fungal Development	Nil	Nil
Smell	Organic/dirt like	Organic/dirt like





6. Plant Growth Study

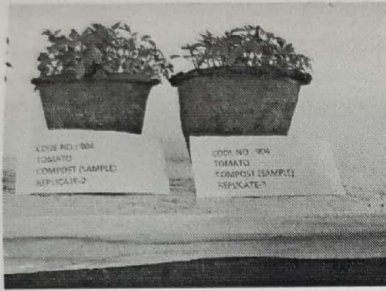
Paddy growth in sample degraded compost



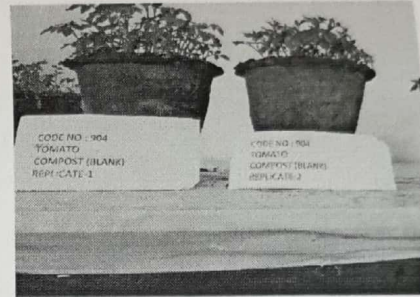
Paddy growth in control compost



Tomato growth in sample degraded compost



Tomato growth in control compost



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Authorized Signatory