सिपेट : पेट्रोकेमिकल्स तकनीकी संस्थान (आईपीटी)
रसायन एव पेट्रोरसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार
गिण्डी, चेन्नै - 600 032.
फोन : 91-44-2225 4701 (6 लाइन)
फैक्स : 91-44-22254707
ई-मेल : chennai@cipet.gov.in
वेब्सइट : www.cipet.gov.in

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स्वच्छ भारत
एक कदम स्वच्छता की ओर

Azadi Ka Amrit Mahotsav

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)
Fax : 91 - 44 - 22254707
E-mail : chennai@cipet.gov.in
Website : www.cipet.gov.in

संदर्भ/Ref: परीक्षण/TR/ 22033100 दिनांक/Date:14-10-2022

प्रति /To,

Vasco Bio Bag Enterprises
D.P.No.81, SIDCO Industrial Estate Sengarai, Sengarai,
Uthukottai, Tamil Nadu 602026.

विषय/Sub : Testing of samples-reg.

संदर्भ/Ref : Your letter no. -
Dated: 04-03-2022

महोदय,

कृपया हमारी परीक्षण रिपोर्ट क्रमांक प्राप्त करे। Please find enclosed herewith our Test Report no.	68906	दिनांक dated	14-10-2022

धन्यवाद,

भवदीय

विशाल
प्रबंधक (परीक्षण)

संलग्न : उपर्युक्तानुसार
Encl:1.a/a.
Remarks:

केंद्रीय पेट्रोरसायन अभियांत्रिकी एवं
प्रौद्योगिकी संस्थान
पेट्रोकेमिकल्स तकनीकी संस्थान
रसायन एवं पेट्रोरसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार
गिण्डी, चेन्नै - 600 032.
फोन : 91-44-2225 4701-6 फैक्स : 91-44-22254707
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ENGINEERING & TECHNOLOGY
INSTITUTE OF PETROCHEMICALS TECHNOLOGY
Department of Chemicals & Petrochemicals
Ministry of Chemicals & Fertilizers, Govt. of India
Guindy, Chennai - 600 032.
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E-mail : chennai@cipet.gov.in Website : www.cipet.gov.in

परीक्षण रिपोर्ट / TEST REPORT

30475
क्र.सं / Sl. No.

को ज़ारी /
Issued to :

Vasco Bio Bag Enterprises
D.P.No.81, SIDCO Industrial Estate Sengarai,
Sengarai, Uthukottai, Tamil Nadu 602026.

रिपोर्ट सं / **REPORT NO. : 68906**

दिनाक / Date : **14-10-2022**

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

संदर्भ / **Customer Let. Ref :** - 04-03-2022

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	:	Biodegradable / Compostable Material ADFLEX-FT - as stated by the party
आ)	सैंपिल प्राप्त होने की तारीख / b) Date of Receipt of sample	:	04-03-2022
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	:	2 kg
ए)	पेंकिंग की रीति / h) Mode of Packing	:	Packed in polythene cover
ऐ)	मोहर बंद या नहीं / i) Sealed or not	:	Not Sealed
ओ)	कोई अन्य सूचना / j) Any other information	:	--

22033100

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) b)	माप करने हेतं लिए गए सहायक दस्तावेज एवं प्राप्त परिणाम Supporting documents for the measurement taken and result derived	:	As given in Part C
इ) c)	संबंधित कार्य अनुदेशों में निर्धारित के अनुसार परीक्षण रीति से कोई परिवर्तन Deviation from the test method as prescribed in relevant work instructions, if any	:	No deviation from the standard

केंद्रीय पेट्रोरसायन अभियांत्रिकी एवं प्रौद्योगिकी संस्थान
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रसायन एवं पेट्रोरसायन विभाग
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गिण्डी, चेन्नै - 600 032.
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परीक्षण रिपोर्ट/TEST REPORT

रिपोर्ट सं / **REPORT NO. :** **68906**

क्र.सं / Sl. No. 30475

दिनाक / Date : **14-10-2022**

भाग - ग / PART - C

परीक्षण परिणाम / TEST RESULTS

Test Duration: 04.03.2022 to 14.10.2022

Sl.No	Name of the Test	Test Method/ Standard	Unit	Results Obtained	Specified Requirements
1	Material Identification	FTIR & DSC	-	Blend of Poly Lactic Acid (PLA) and Poly Butylene Adipate Co-Terephthalate (PBAT)	-
2	Disintegration (Dry mass remains in 2 mm sieve after 84 days)	ISO 17088:2021	%	7.4	No more than 10%
3	Ultimate aerobic Biodegradation (with reference to 100% degradation of positive reference)	ISO 17088:2021	%	90.2% (at the end of 140 days)	> 90 (at the end of the test period not more than 180 days.)
4	Plant Growth study				
	Monocotyledon (Onion) % Seed emergence	ISO 17088:2021 Cl.6.4.3	%	91	> 90
	Dicotyledon (Tomato) % Seed Emergence		%	94	> 90
5	Acute Ecotoxic effects to earthworm				
a	Survival of adult earthworm at the end of 7 days	ISO:17088:2021 Cl.6.4.4	%	96	> 90
b	Survival of adult earthworm at the end of 14 days			96	> 90
c	Biomass end of the 14 days			92	> 90
6	Chronic Ecotoxic effects to earthworm				
a	Survival of adult earthworm at the end of 28 days	ISO:17088:2021 Cl.6.4.5	%	92	> 90
b	Survival of adult earthworm at the end of 56 days			95	> 90
c	Offspring at the end of 56 days			94	> 90
d	Biomass end of the 56 days			96	> 90

The detailed observation on biodegradability test is enclosed as Annexure

AUTHORISED SIGNATORY

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रिपोर्ट सं / **REPORT NO. : 68906**

परीक्षण परिणाम **/ TEST RESULTS**

दिनाक / Date : **14-10-2022**

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)	ISO 17088:2021	mg/kg	BDL (DL:0.006)	10
b.	Copper (Cu)			BDL (DL:0.002)	300
c.	Nickel (Ni)			BDL (DL:0.005)	50
d.	Zinc (Zn)			13.9	1000
e	Cobalt (Co)			114.3	-
f.	Chromium (Cr)			BDL (DL:0.0009)	50
g.	Molybdenum (Mo)			BDL (DL:0.006)	-
h.	Mercury (Hg)			BDL (DL:0.0007)	0.15
i.	Cadmium (Cd)			BDL (DL:0.003)	5
j.	Lead (Pb)			6.3	100
k.	Selenium (Se)			BDL (DL:0.013)	-

* 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: BDL-Blow Detection Limit ; DL-Detection Limit

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
6. Subcontracted Tests (if any): Nil

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रिपोर्ट सं / **REPORT NO. :** **68906**

परीक्षण परिणाम / **TEST RESULTS**

दिनाक / Date : **14-10-2022**

OBSERVATION FOR BIODEGRADABILITY TEST AS PER ISO 17088:2021

Name of the Party : M/s. Vaso Bio Bag Enterprises,
D.P. No.81, SIDCO Industrial Estate, Sengarai, Uthukottai
Tamil Nadu - 602026.

1 **Sample Details (As stated by Party):** Biodegradable / Compostable Material ADFLEX-FT

2 **Material Identification by FTIR** : Blend of Poly Lactic Acid (PLA) and Poly Butylene Adipate Co-Terephthalate (PBAT)

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 (^{o}C)	:	58
Dry Solid (%)	:	53.4
Volatile content (%)	:	17.9
CO_2 evolved during first 10days in blank	:	87.56 mg/g
Test duration (days)	:	140 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	7.5	7.3
2	Blank 2	7.4	7.3
3	Blank 3	7.4	7.3
4	Cellulose 1	7.4	7.2
5	Cellulose 2	7.4	7.3
6	Cellulose 3	7.4	7.2
7	Negative 1	7.4	7.3
8	Negative 2	7.4	7.3
9	Negative 3	7.4	7.3
10	Sample 1	7.4	7.3
11	Sample 2	7.4	7.2
12	Sample 3	7.4	7.3

Contd..

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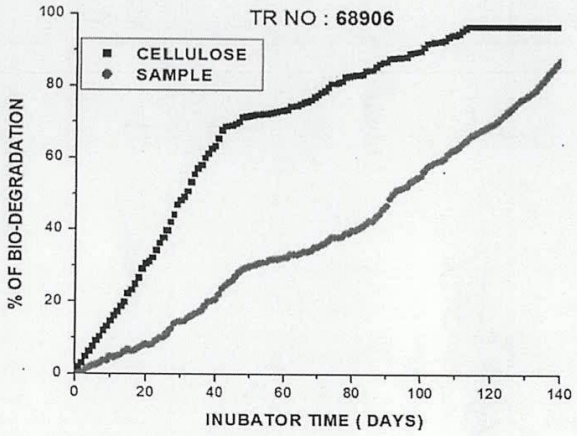
परीक्षण परिणाम **/ TEST RESULTS**

दिनाक / Date : **14-10-2022**

4 **Result:** Percentage biodegradation relative to positive reference

Sample (Mean)	:	90.2 % at the end of 140 days
The reference Material - cellulose	:	~ 100%



5 **Visual Observation of Sample**

Description	Week 3	Week 6	Week 9
Structure	Cut pieces	Cut pieces	Fragmented pieces
Moisture	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level
Colour	Pale white	Dirty	Dirty
Fungal Development	None	None	None
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like

Description	Week 12	Week 16	Week 20
Structure	Fragmented pieces	Fragmented pieces	Fragmented pieces
Moisture	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level
Colour	Dirty	Dirty	Dirty
Fungal Development	None	None	None
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like

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परीक्षण परिणाम **/ TEST RESULTS**

दिनाक / Date : **14-10-2022**

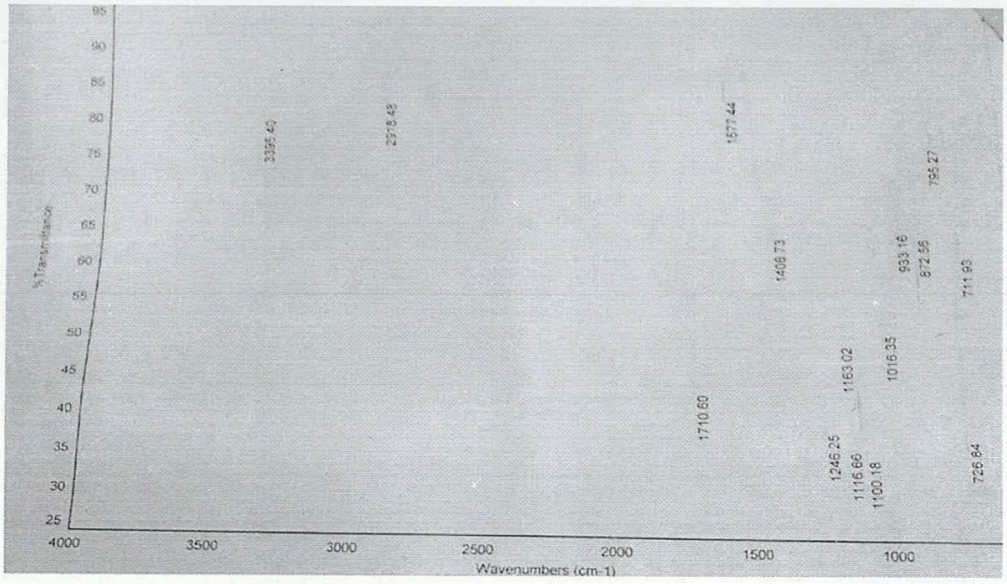
6 Visual Observation of Compost

Description	Week 3	Week 6	Week 9
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 12	Week 16	Week 20
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 FTIR Analysis

Sample Details (As stated by Party): Biodegradable / Compostable Material ADFLEX-FT



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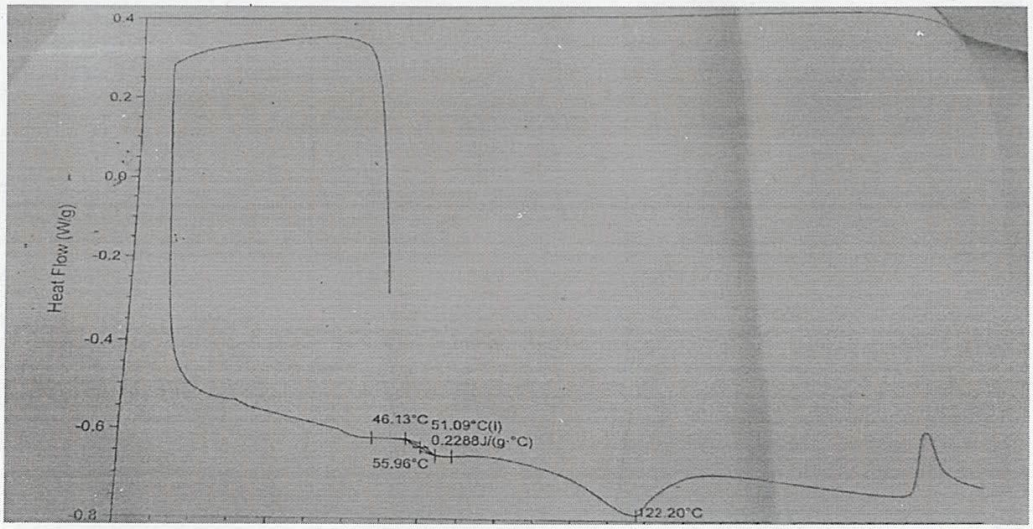
परीक्षण परिणाम **/ TEST RESULTS**

दिनाक / Date : **14-10-2022**

FTIR Interpretation

Wave number (cm^{-1})	Nature of Bond
2918	CH_2 asymmetric stretching
1710	C–O in PLA and PBAT
1408	-CH_2 Plane Bending
1246	C-O bonds of PBAT
1163	C-O bonds of PBAT
1016	C-O bonds of PBAT
872	O-CH-CH_2-H of ester
726	CH_2 Plane of benzene ring

8 DSC Analysis



Comment: The above DSC & FTIR analysis indicates the above sample is Blend of Poly Lactic Acid (PLA) and Poly Butylene Adipate Co-Terephthalate (PBAT)

Contd.,

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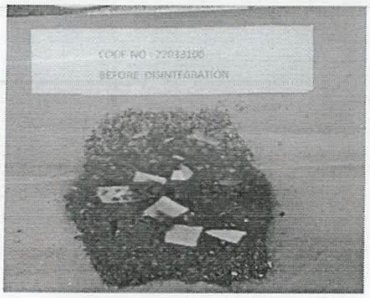
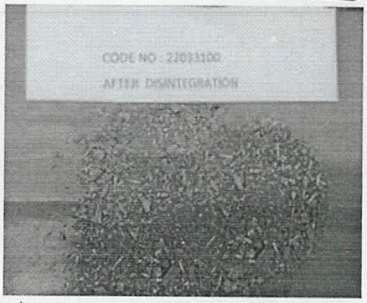
परीक्षण परिणाम **/ TEST RESULTS**

दिनाक / Date : **14-10-2022**

9 Disintegration After 12 Weeks



Before Disintegration



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 Seed Germination & Plant growth study

Onion Compost (Blank)

Onion Compost (Sample)

Tomato Compost (Blank)

Tomato Compost (Sample)

The percentage of seed germination rate is found to be greater than 90% for both Onion and Tomato

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