Greenware© REVOLUTION
Ecofriendly biodegradable Products & Machinery

42E,ChoulpattyRoad,Kolkata-700010
6290515957
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Website:www.greenware.co.in

सिपेट : एस. ए. आर. पि.-पॉलीमेरीक, मटेरीयल में अत्याधुनिक अनुसंधान हेतु प्रयोगशाला
रसायन एवं पेट्रोरसायन विभाग, रसायन एवं उर्वरक मंत्रालय, भारत सरकार
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CIPET : SARP - LABORATORY FOR ADVANCED RESEARCH IN POLYMERIC MATERIALS
Dept. of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Govt. of India
B/25, C.N.I. Complex, Patia, Bhubaneswar-751 024, Odisha
Ph : 0674 - 2742852, 2740173, Fax : 0674 - 2740463
E-mail : larpm@cipet.gov.in, Web : www.larpm.gov.in
सिपेट CIPET

LARPM/CIPET/Testing/2024-25/ **Date- 02.04.2024**

To,
M/s. Greenware Revolution
42E, Chaulpatty Road (Ardhendu Sekhar Naskar Sarani)
Kolkata, West Bengal - 700010
Mob: 9830011227

Sub –Test Report –Reg.

Dear Sir,

Ref No: 1) Letter Ref: GR-G Bio-001/23-24 dated 23.04.2023 & SSF
2) Our Work Order No.: LARPM/BBS./2023-24/064 dated 30.06.2023

With reference to the above cited subject, please find enclosed herewith **Test Report No. 01146 dated 02.04.2024.**

Kindly acknowledge the receipt of the same.

Thanks & Regards,

Director & Head
(Principal Scientist)

Encl: As above

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CERTIFICATE OF ANALYSIS AS PER ISO 17088:2021

LARPM/CIPET/Testing/2024-25/ **Date-02.04.2024**

To,
M/s. Greenware Revolution
42E, Chaulpatty Road (Ardhendu Sekhar Naskar Sarani)
Kolkata, West Bengal - 700010

Sub –Test Report–Reg.

Dear Sir,

Ref No : 1) Letter Ref: GR-G Bio-001/23-24 dated 23.04.2023 & SSF
2) Our Work Order No.: LARPM/BBS./2023-24/064 dated 30.06.2023
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. Greenware Revolution 42E, Chaulpatty Road (Ardhendu Sekhar Naskar Sarani) Kolkata, West Bengal - 700010**
Sample Details	**: "Biodegradable carry bags in different size", Sample ID: Biodegradable carry bags** — as stated by the party.
Test Report No	**: 01146 & dated 02.04.2024**
Date of Receipt of sample	**: 30.06.2023**
Date of Initiation	**: 09.08.2023**
Date of Completion	**: 25.03.2024**
Percentage of Compostability In 153 days	**: 91.44**
Requirement of Compostability in 180 days as per ISO 17088:2021	**: 90 %**

The sample submitted by **M/s. Greenware Revolution** is compostable and the percentage of compostability in **153 days reported vide test report No. 01146 is 91.44%.**

The submitted sample also complies with the terms of compostability seed germination and disintegration as per ISO 17088:2021.

Thanks & Regards,

Dr. Akshaya Kumar Palai
(Quality Manager)
Encl : Analysis Report

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ANALYSIS REPORT

Report No. : 01146
Date : 02.04.2024

Issued to
M/s. Greenware Revolution
42E, Chaulpatty Road (Ardhendu Sekhar Naskar Sarani)
Kolkata, West Bengal - 700010

Customer Ref. No. & Date : Letter Ref: GR-G Bio-001/23-24 dated 23.04.2023 & SSF
Work order Ref. No. & Date : LARPM/BBS./2023-24/064 dated 30.06.2023
As per Standard : Refer part C

PART A: PARTICULARS OF SAMPLE SUBMITTED

a) Name of the Sample	: **"Biodegradable carry bags in different size"** -as stated by the party.
b) Grade/verity/Type/Size/Class etc.	: Nil.
c) Code No.	: **Biodegradable carry bags** -as stated by the party.
d) Quantity (pcs.,/mtr/gm/nos)	: 500 g (Approx)
e) Mode of packing (Sealed carton/polypouch/container or not)	: Packed in Carton.
f) Date of receipt of sample	: 30.06.2023
g) Date of Performance of test	: 30.06.2023 – 25.03.2024
h) Any other information	: Interim Report No. 01070 dated 17.01.2024

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

02.04.2024
Mr. Pinaki Chatterjee
(Technical Manager)
AUTHORISED SIGNATORY

02/04/2024
Dr. Akshaya Kumar Palai
(Quality Manager)
AUTHORISED SIGNATORY

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PART C: TEST RESULTS **ANALYSIS REPORT**

Report No : 01146
Date : 02.04.2024

Sl. No	Name of the Test	Test Method/Standard	Unit	Results obtained	Specified Requirements
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		%	98.4	
6.	**Chronic Ecotoxic Effects to earthworm**				
a.	Survival of adult 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.	Offspring at the end of 56 days		%	100	
c.	Biomass at the end of 56 days		%	94.3	

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

02.04.2024
Mr.Pinaki Chatterjee
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AUTHORISED SIGNATORY

02/04/2024
Dr. Akshaya Kumar Palai
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PART C: TEST RESULTS **ANALYSIS REPORT**

Report No : 01146
Date : 02.04.2024

Sl. No	Name of the Test	Test Method/Standard	Unit	Results Obtained	Specified Requirements
	Sample Details: "Biodegradable carry bags in different size", **Sample ID: Biodegradable carry bags** — as stated by the party.				
1.	Material Identification	FTIR/DSC	--	Polylactic Acid (PLA) & Polybutylene adipate terephthalate (PBAT) based material	---
2.	Disintegration (Dry mass remains in 2 mm sieve after 84 days)	Cl. 6.2 of ISO 17088:2021	%	8.08	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	%	91.44 (at the end of 153 days)	> 90 (at the end of the test period not more than 180 days.)
4.	Plant Growth study **a) Monocotyledon (Rice)** % Seed Emergence **b) Dicotyledon (Mung)** % Seed Emergence	Cl. 6.4.3 of ISO 17088:2021 (Annex C)	 % %	 93.62 96.34	 > 90 > 90

02.04.2024
Mr.Pinaki Chatterjee
(Technical Manager)
AUTHORISED SIGNATORY

02/04/2024
Dr. Akshaya Kumar Palai
(Quality Manager)
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ANALYSIS REPORT

Report No.: 01146
Date : 02.04.2024

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	0.05	10
b	Cadmium (Cd)			1.63	5
c	Chromium (Cr)			2.12	50
d	Copper (Cu)			0.84	300
e	Lead (Pb)			1.68	100
f	Mercury (Hg)			0.01	0.15
g	Nickel (Ni)			0.76	50
h	Zinc (Zn)			11.96	1000

(*) – Based on the solid waste management Rules, 2016 notified on 08th April 2016 by Ministry of Environment, Forests & Climate Change, Government of India.

PART D: REMARKS: NIL

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

** End of the Report **

Mr. Pinaki Chatterjee
(Technical Manager)
AUTHORISED SIGNATORY

Dr. Akshaya Kumar Palai
(Quality Manager)
AUTHORISED SIGNATORY