

**सिपेट : पेट्रोकेमिकल्स तकनीकी  
संस्थान (आईपीटी)**

(पूर्व में सेन्ट्रल इंस्टिट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एंड टेक्नोलॉजी)  
रसायन एवं पेट्रोसायन विभाग  
रसायन एवं उर्वरक मंत्रालय, भारत सरकार  
गिण्डी, चेन्नै - 600 032.  
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**CIPET : INSTITUTE OF PETROCHEMICALS  
TECHNOLOGY (IPT)**

(Formerly Central Institute of Plastics Engineering & Technology)

Department of Chemicals & Petrochemicals

Ministry of Chemicals & Fertilizers, Govt. of India

Guindy, Chennai - 600 032.

Phone : 91-44-2225 4701 (6 Lines)

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Website : www.cipet.gov.in

संदर्भ/Ref: परीक्षण /TR/ 22122551

दिनांक/Date: 26-06-2023

प्रति /To,

Huhtamaki Foodservice Packaging India Private Limited  
Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

विषय/Sub : Testing of samples-reg.

संदर्भ/Ref : Your letter no. PO No.HFSIPL/PO/SER/22-23/0002

Dated: 29-11-2022

महोदय,

कृपया हमारी परीक्षण रिपोर्ट क्रमांक प्राप्त करें। Please find enclosed herewith our Test Report no.	73122	दिनांक dated	26-06-2023
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धन्यवाद,

भवदीय

**विशाल**  
प्रबंधक (परीक्षण)

संलग्न : उपर्युक्तानुसार

Encl:1.a/a.

Remarks:

**मुख्यालय :** सिपेट, गिण्डी, चेन्नै - 600 032. **Head Office :** CIPET, Guindy, Chennai - 600 032.

**केन्द्र :** अहमदाबाद, अमृतसर, औरंगाबाद, अगरतला, बदी, बालासोर, बेंगलुरु, भोपाल, भुवनेश्वर, चन्द्रपुर, चेन्नई, देहरादून, गुरुग्राम, गुवाहाटी, ग्वालियर, हैदराबाद, हाजीपुर, हल्दिया, इम्फाल, जयपुर, कोच्चि, कोरबा, लखनऊ, मदुरै, मुरथल, मैसूरु, रायपुर, राँची, वलसाड, वाराणसी एवं विजयवाड़ा  
**Centres :** Ahmedabad, Amritsar, Aurangabad, Agartala, Baddi, Balasore, Bengaluru, Bhopal, Bhubaneswar, Chandrapur, Chennai, Dehradun, Gurugram, Guwahati, Gwalior, Hyderabad, Hajipur, Haldia, Imphal, Jaipur, Kochi, Korba, Lucknow, Madurai, Murthal, Mysuru, Raipur, Ranchi, Valsad, Varanasi & Vijayawada

केंद्रीय पेट्रोसायन अभियांत्रिकी एवं  
प्रौद्योगिकी संस्थान  
पेट्रोकेमिकल्स तकनीकी संस्थान

रसायन एवं पेट्रोसायन विभाग  
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ENGINEERING & TECHNOLOGY  
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परीक्षण रिपोर्ट / TEST REPORT

को जारी /  
Issued to :

**Huhtamaki Foodservice Packaging India Private Limited**  
Survey No.54B, Hissa No.3A, Jangid Commercial  
Point, Dhamangaon Village, Bhiwandi, Thane,  
Maharashtra 421302.

क्र.सं / Sl. No. **32716**

रिपोर्ट सं / REPORT NO. : **73122**

दिनांक / Date : **26-06-2023**

Pages.....01.....Nos. Part A,B,C & D

संदर्भ / Customer Let. Ref : PO No.HFSIPL/PO/SER/22- 29-11-2022  
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 : PLA Coated Paper Cup - as stated by the party
- आ) सैंपिल प्राप्त होने की तारीख / b) Date of Receipt of sample : 01-12-2022
- 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 : 1.5 kg
- ए) पैकिंग की रीति / h) Mode of Packing : carton packing
- ऐ) मोहर बंद या नहीं / i) Sealed or not : Sealed
- ओ) कोई अन्य सूचना / j) Any other information : ..

22122551

**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) 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

*Bas* *[Signature]*

केंद्रीय पेट्रोसायन अभियांत्रिकी एवं  
प्रौद्योगिकी संस्थान  
पेट्रोकेमिकल्स तकनीकी संस्थान

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परीक्षण रिपोर्ट / TEST REPORT

रिपोर्ट सं / REPORT NO. :

73122

क्र.सं / Sl. No. 32716

दिनांक / Date : 26-06-2023

भाग - ग / PART - C

परीक्षण परिणाम / TEST RESULTS

Test Duration: 09.12.2022 to 26.06.2023

Sl.No	Name of the Test	Test Method/ Standard	Unit	Results Obtained	Specified Requirements
1	Material Identification	FTIR & DSC	-	Paper cup inner side coated with Poly Lactic Acid	-
2	Disintegration (Dry mass remains in 2 mm sieve after 84 days)	ISO 17088:2021	%	7.2	No more than 10%
3	Ultimate aerobic Biodegradation (with reference to 100% degradation of positive reference)	ISO 17088:2021	%	91.2 (at the end of 124 days)	> 90 (at the end of the test period not more than 180 days.)
4	Plant Growth study Monocotyledon (Rice) % Seed emergence	ISO 17088:2021 Cl.6.4.3	%	95	> 90
	Dicotyledon (Fenugreek) % Seed Emergence		%	95	> 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	%	98	> 90
b	Survival of adult earthworm at the end of 14 days			98	> 90
c	Biomass end of the 14 days			96	> 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	%	97	> 90
b	Survival of adult earthworm at the end of 56 days			97	> 90
c	Offspring at the end of 56 days			95	> 90
d	Biomass end of the 56 days			95	> 90

The detailed observation on biodegradability test is enclosed as Annexure

Contd.

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Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

Ref. PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

2 of 7

  
AUTHORISED SIGNATORY  
Dr. Radhashyam Giri  
Technical Officer

  
AUTHORISED SIGNATORY  
Vishal Verma  
Manager (T)



रिपोर्ट सं / REPORT NO. : **73122**

परीक्षण परिणाम / TEST RESULTS

दिनांक / Date :

**26-06-2023**

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**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)			0.045	10
b.	Copper (Cu)			1.793	300
c.	Nickel (Ni)			3.578	50
d.	Zinc (Zn)			5.85	1000
e.	Cobalt (Co)	ISO 17088:2021	mg/kg	0.443	-
f.	Chromium (Cr)			2.835	50
g.	Molybdenum (Mo)			7.957	-
h.	Mercury (Hg)			0.005	0.15
i.	Cadmium (Cd)			0.038	5
j.	Lead (Pb)			1.725	100
k.	Selenium (Se)			0.098	-

\* 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.

**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 from the date of issue.
6. Subcontracted Tests (if any): Nil

3 of 7

  
AUTHORISED SIGNATORY  
Dr. Radhashyam Giri  
Technical Officer

  
AUTHORISED SIGNATORY  
Vishal Verma  
Technical Officer

रिपोर्ट सं / REPORT NO. : **73122**

परीक्षण परिणाम / TEST RESULTS

दिनांक / Date :

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Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

**OBSERVATION FOR BIODEGRADABILITY TEST AS PER ISO 17088:2021**

- 1 **Sample Details (As stated by Party):** PLA Coated Paper Cup
- 2 **Material Identification by FTIR** : Paper cup inner side coated with poly lactic acid

**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 (°C) : 58  
Dry Solid (%) : 54.8  
Volatile content (%) : 16.9  
CO<sub>2</sub> evolved during first 10days in blank : 55.44 mg/g  
Test duration (days) : 124 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	7.1	7.1
2	Blank 2	7.2	7.2
3	Blank 3	7.2	7.3
4	Cellulose 1	7.1	7.1
5	Cellulose 2	7.4	7.2
6	Cellulose 3	7.4	7.3
7	Negative 1	7.3	7.3
8	Negative 2	7.3	7.2
9	Negative 3	7.3	7.2
10	Sample 1	7.2	7.1
11	Sample 2	7.2	7
12	Sample 3	7.3	7.3

Contd., 4 of 9

  
AUTHORISED SIGNATORY  
Dr. Radhshyam Giri  
Technical Officer

  
AUTHORISED SIGNATORY  
Manager (T)

रिपोर्ट सं / REPORT NO. : 73122

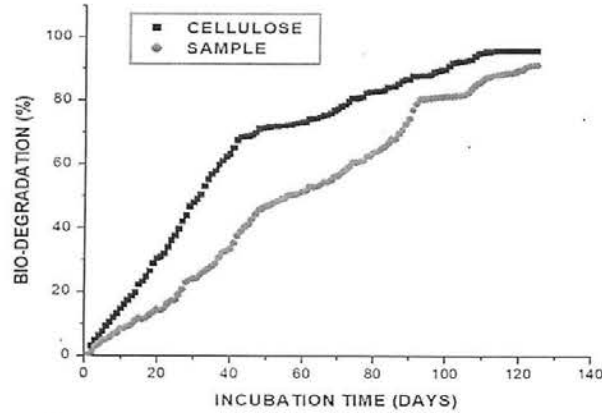
परीक्षण परिणाम / TEST RESULTS

दिनांक / Date : 26-06-2023

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Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

- 4 **Result:** Percentage biodegradation relative to positive reference  
Sample (Mean) : 91.2% at the end of 124 days  
The reference Material - cellulose : ~ 100%



5 Visual Observation of Sample

Description	Week 1-3	Week 4-6	Week 7-9
Structure	Cut pieces	Cut pieces	Fragmented pieces
Moisture	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level
Colour	White	Dirty	Dirty
Fungal Development	None	None	None
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like

Description	Week 10-12	Week 13-15	week 16-18
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

Contd., 5 of 7

  
AUTHORISED SIGNATORY  
Technical Officer

  
AUTHORISED SIGNATORY  
Vishal Verma



रिपोर्ट सं / REPORT NO. : **73122**

परीक्षण परिणाम / TEST RESULTS

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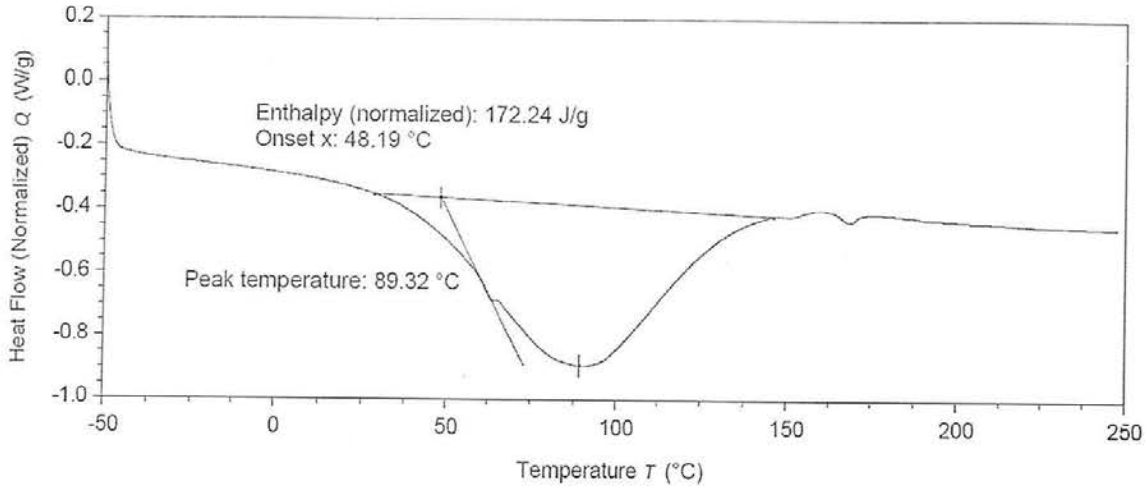
Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

## 6 Visual Observation of Compost

Description	Week 1-3	Week 4-6	Week 7-9
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 10-12	Week 13-15	Week 16-18
Structure	Fine Particles	Fine Particles	Fine Particles
Moisture	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level
Colour	Dark Brown	Dark Brown	
Fungal Development	Nil	Nil	Nil
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like

## 7 DSC Analysis



6/5 Contd.,

  
AUTHORISED SIGNATORY  
Dr. Rameshram Gin  
Technical Officer

  
AUTHORISED SIGNATORY  
Manager (T)

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**26-06-2023**

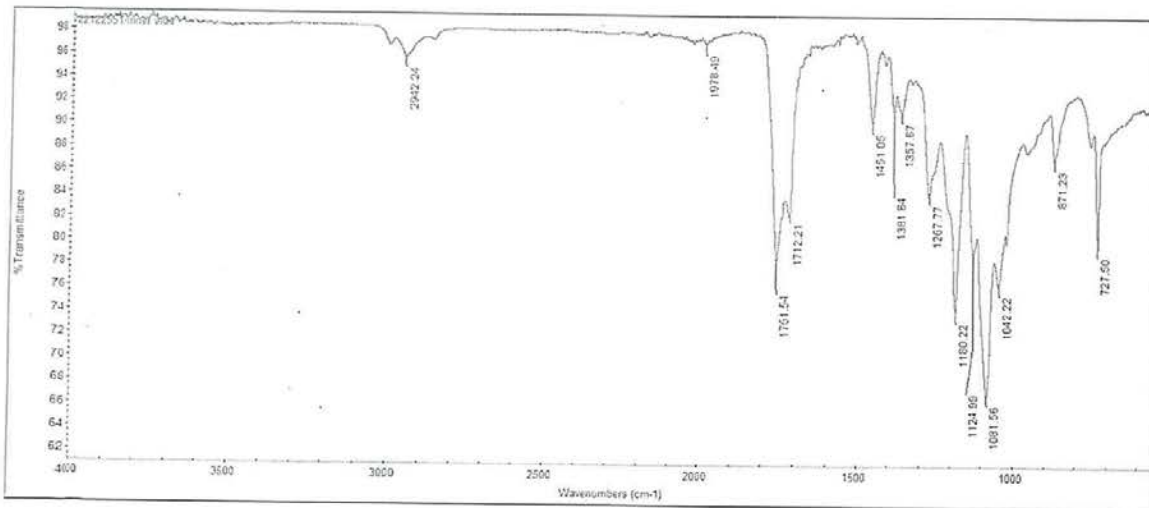
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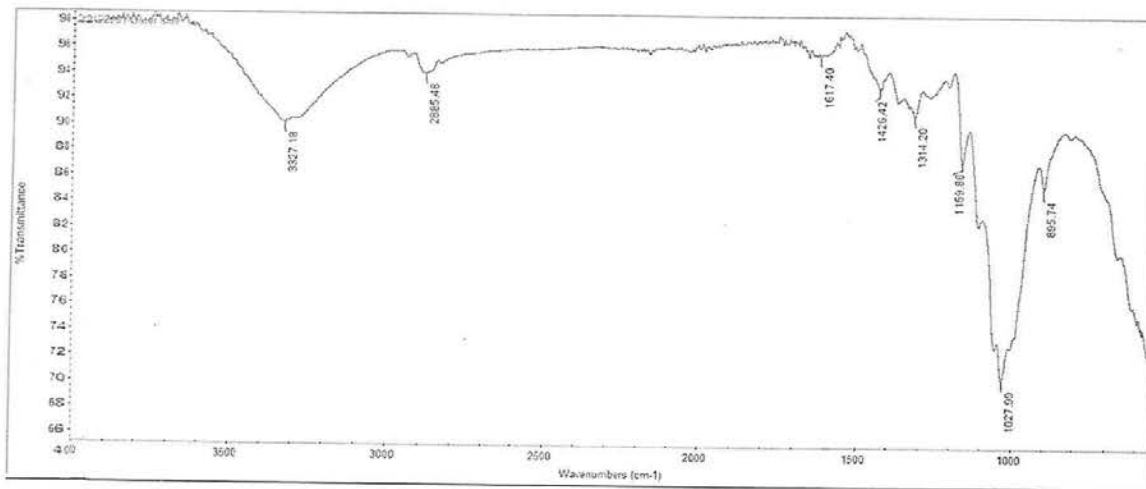
**8 FTIR Analysis**

Sample Details (As stated by Party): **PLA Coated Paper Cup**

**Inner side**



**outer side**



7 of 7  
Contd.,

**Technical Officer**

**Authorised Signatory**  
Vishal Verma



सिपेट : आई पी टी -चेन्नै-32.  
CIPET : IPT - Chennai-32.



Continuation Sheet

रिपोर्ट सं / REPORT NO. : 73122

परीक्षण परिणाम / TEST RESULTS

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### FTIR Interpretation

#### Inner side

Wave number (cm <sup>-1</sup> )	Nature of Bond
2942	C-H stretch
1751	C=O stretch
1451	C=C stretch
1357	C-H in Plane bend
1124	C-C stretch
1081	C-O stretch
871	C-H bend

#### Outer side

Wave number (cm <sup>-1</sup> )	Nature of Bond
3327	O-H stretching
2885	C-H stretch
1617	C=O stretch
1426	C=C stretch
1314	C-H in Plane bend
1159	C-C stretch
1027	C-O stretch
895	C-H bend

**Comment:** The above DSC & FTIR analysis indicates the above sample is  
Paper cup inner side coated with poly lactic acid

Contd.,

३०१

  
AUTHORISED SIGNATORY  
Dr. Neelashyam Gini  
Technical Officer

  
AUTHORISED SIGNATORY  
Manan (T)  
Mananer (T)

रिपोर्ट सं / REPORT NO. : **73122**

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**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 Plant growth study**



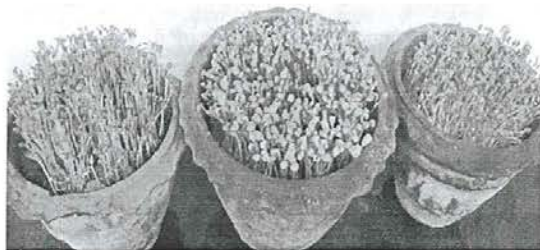
REP-1 REP-2 REP-3

Fresh compost with Rice seeds



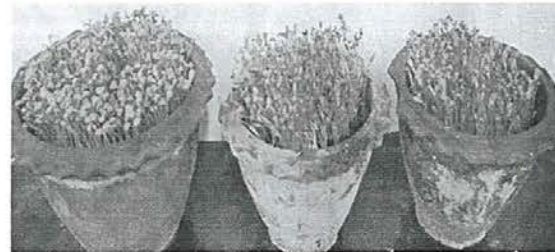
REP-1 REP-2 REP-3

Bio-degradation tested compost with Rice seeds



REP-1 REP-2 REP-3

Fresh compost with Fenugreek seeds



REP-1 REP-2 REP-3

Bio-degradation tested compost with Fenugreek seeds

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

9 of 7

  
AUTHORISED SIGNATORY  
Dr. Radhashyam Giri  
Technical Officer

  
AUTHORISED SIGNATORY  
Manager (T)

**सिपेट : पेट्रोकेमिकल्स तकनीकी  
संस्थान (आईपीटी)**

(पूर्व में सेंट्रल इंस्टिट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एण्ड टेक्नोलॉजी)  
रसायन एवं पेट्रोसायन विभाग  
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CIPET सिपेट  
probe - perfum - practice - Plastics



**CIPET : INSTITUTE OF PETROCHEMICALS  
TECHNOLOGY (IPT)**

(Formerly Central Institute of Plastics Engineering & Technology)

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/ 22122552

दिनांक/Date: 26-06-2023

प्रति /To.

Huhtamaki Foodservice Packaging India Private Limited  
Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

विषय/Sub : Testing of samples-reg.

संदर्भ/Ref : Your letter no. PO No.HFSIPL/PO/SER/22-23/0002

Dated: 29-11-2022

महोदय,

कृपया हमारी परीक्षण रिपोर्ट क्रमांक प्राप्त करें। Please find enclosed herewith our Test Report no.	73123	दिनांक dated	26-06-2023
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धन्यवाद,

भवदीय

प्रबंधक (परीक्षण)

संलग्न : उपर्युक्तानुसार

Encl: 1.a/a.

Remarks:

मुख्यालय : सिपेट, गिण्डी, चेन्नै - 600 032. Head Office : CIPET, Guindy, Chennai - 600 032.

केंद्र : अहमदाबाद, अमृतसर, औरंगाबाद, अगरतला, बर्ही, बालासोर, बेंगलुरु, भोपाल, भुवनेश्वर, चन्द्रपुर, चेन्नई, देहरादून, गुरुग्राम, गुवाहाटी, ग्वालियर, हैदराबाद, हाजीपुर, हल्दिया, इम्फाल, जयपुर, कोच्चि, कोरबा, लखनऊ, मदुरै, मुस्थल, मैसूरु, रायपुर, राँची, वलसाड, वाराणसी एवं विजयवाड़ा  
Centres : Ahmedabad, Amritsar, Aurangabad, Agartala, Baddi, Balasore, Bengaluru, Bhopal, Bhubaneswar, Chandrapur, Chennai, Dehradun, Gurugram, Guwahati, Gwalior, Hyderabad, Hajipur, Haldia, Imphal, Jaipur, Kochi, Korba, Lucknow, Madurai, Murthal, Mysuru, Raipur, Ranchi, Valsad, Varanasi & Vijayawada



केंद्रीय पेट्रोसायन अभियांत्रिकी एवं  
प्रौद्योगिकी संस्थान  
पेट्रोकेमिकल्स तकनीकी संस्थान

रसायन एवं पेट्रोसायन विभाग  
रसायन एवं उर्वरक मंत्रालय, भारत सरकार  
गिण्टी, चेन्नै - 600 032.  
फोन : 91-44-2225 4701-6 फैक्स : 91-44-22254707  
ई-मेल : chennai@cipet.gov.in वेबसाइट : www.cipet.gov.in



CIPET सि.पि.ए.  
petrochemicals engineering & technology



CENTRAL INSTITUTE OF PETROCHEMICALS  
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**

को जारी /  
Issued to :

**Huhtamaki Foodservice Packaging India Private Limited**  
Survey No.54B, Hissa No.3A, Jangid Commercial  
Point, Dhamangaon Village, Bhiwandi, Thane,  
Maharashtra 421302.

क्र.सं / Sl. No. **32717**

रिपोर्ट सं / REPORT NO. : **73123**

दिनांक / Date : **26-06-2023**

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

संदर्भ / Customer Let. Ref : PO No.HFSIPL/PO/SER/22- 29-11-2022  
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 : PBS Coated Paper Cup - as stated by the party
- आ) सैपिल प्राप्त होने की तारीख / b) Date of Receipt of sample : 01-12-2022
- 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 : 1.5 kg
- ए) पैकिंग की रीति / h) Mode of Packing : carton packing
- ऐ) मोहर बंद या नहीं / i) Sealed or not : Sealed
- ओ) कोई अन्य सूचना / j) Any other information : --

22122552

**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

*BS*

*[Signature]*

केंद्रीय पेट्रोसायन अभियांत्रिकी एवं  
प्रौद्योगिकी संस्थान  
पेट्रोकेमिकल्स तकनीकी संस्थान

रसायन एवं पेट्रोसायन विभाग  
रसायन एवं उर्वरक मंत्रालय, भारत सरकार  
गिण्टी, चेन्नै - 600 032.  
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ई-मेल : chennai@cipet.gov.in वेबसाइट : www.cipet.gov.in



CIPET सि रेट  
Petrochemicals Engineering & Technology



CENTRAL INSTITUTE OF PETROCHEMICALS  
ENGINEERING & TECHNOLOGY  
INSTITUTE OF PETROCHEMICALS TECHNOLOGY

Department of Chemicals & Petrochemicals  
Ministry of Chemicals & Fertilizers, Govt. of India  
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E-mail : chennai@cipet.gov.in Website : www.cipet.gov.in

73123 परीक्षण रिपोर्ट / TEST REPORT

रिपोर्ट सं / REPORT NO. :  
26-06-2023

क्र.सं / Sl. No. 32717

दिनांक / Date :

भाग - ग / PART - C

परीक्षण परिणाम / TEST RESULTS

Test Duration: 09.12.2022 to 26.06.2023

Sl.No	Name of the Test	Test Method/ Standard	Unit	Results Obtained	Specified Requirements
1	Material Identification	FTIR & DSC	-	Paper cup inner side coated with Polybutylene succinate	-
2	Disintegration (Dry mass remains in 2 mm sieve after 84 days)	ISO 17088:2021	%	9.1	No more than 10%
3	Ultimate aerobic Biodegradation (with reference to 100% degradation of positive reference)	ISO 17088:2021	%	90.3 (at the end of 122 days)	> 90 (at the end of the test period not more than 180 days.)
4	Plant Growth study Monocotyledon (Rice) % Seed emergence	ISO 17088:2021 Cl.6.4.3	%	95	> 90
	Dicotyledon (Fenugreek) % Seed Emergence		%	95	> 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	%	98	> 90
b	Survival of adult earthworm at the end of 14 days			98	> 90
c	Biomass end of the 14 days			96	> 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	%	97	> 90
b	Survival of adult earthworm at the end of 56 days			97	> 90
c	Offspring at the end of 56 days			95	> 90
d	Biomass end of the 56 days			95	> 90

The detailed observation on biodegradability test is enclosed as Annexure

Contd.

Issued to:

M/s. Huhtamaki Foodservice Packaging India Private Limited,  
Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

Ref. PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

2 of 7

  
AUTHORISED SIGNATORY  
Dr. Radhashyam Gin  
Technical Officer

  
AUTHORISED SIGNATORY  
Vishal Verma  
Manager (T)

रिपोर्ट सं / REPORT NO. : 73123

परीक्षण परिणाम / TEST RESULTS

दिनांक / Date :

26-06-2023

Issued to: M/s. Huhtamaki Foodservice Packaging India Private Limited ,  
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Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

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)			1.613	10
b.	Copper (Cu)			1.965	300
c.	Nickel (Ni)			4.373	50
d.	Zinc (Zn)			5.01	1000
e.	Cobalt (Co)	ISO 17088:2021	mg/kg	1.403	-
f.	Chromium (Cr)			5.04	50
g.	Molybdenum (Mo)			1.35	-
h.	Mercury (Hg)			0.005	0.15
i.	Cadmium (Cd)			0.06	5
j.	Lead (Pb)			1.17	100
k.	Selenium (Se)			0.098	-

\* 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.

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 from the date of issue.
6. Subcontracted Tests (if any): Nil

Contd.,

309

  
AUTHORISED SIGNATORY  
Dr. Radhashyam Giri  
Technical Officer

  
AUTHORISED SIGNATORY  
Manager (T)



रिपोर्ट सं / REPORT NO. : 73123

परीक्षण परिणाम / TEST RESULTS

दिनांक / Date :

26-06-2023

Issued to: M/s. Huhtamaki Foodservice Packaging India Private Limited ,  
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Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

OBSERVATION FOR BIODEGRADABILITY TEST AS PER ISO 17088:2021

- 1 Sample Details (As stated by Party): PBS Coated Paper Cup
- 2 Material Identification by FTIR : Paper cup inner side coated with Polybutylene succinate

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 (°C) : 58  
Dry Solid (%) : 54.8  
Volatile content (%) : 16.9  
CO<sub>2</sub> evolved during first 10days in blank : 55.44 mg/g  
Test duration (days) : 122 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	7.3	7.2
2	Blank 2	7.4	7.3
3	Blank 3	7.4	7.3
4	Cellulose 1	7.3	7.3
5	Cellulose 2	7.2	7.2
6	Cellulose 3	7.4	7.3
7	Negative 1	7.1	7.1
8	Negative 2	7.3	7.2
9	Negative 3	7.3	7.2
10	Sample 1	7.3	7.2
11	Sample 2	7.4	7.3
12	Sample 3	7.3	7.2

Contd.,

4 of 4

  
AUTHORISED SIGNATORY  
Technical Officer

  
AUTHORISED SIGNATORY  
Manager (T)

रिपोर्ट सं / **REPORT NO. : 73123**

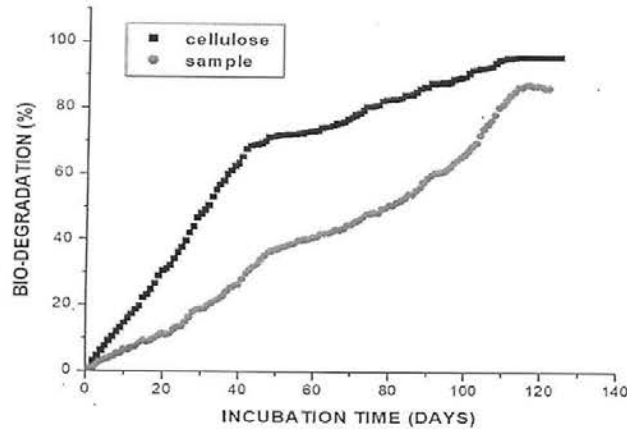
परीक्षण परिणाम / **TEST RESULTS**

दिनांक / Date : **26-06-2023**

Issued to: M/s. Huhtamaki Foodservice Packaging India Private Limited ,  
 Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
 Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

- 4 Result:** Percentage biodegradation relative to positive reference  
 Sample (Mean) : 90.3 % at the end of 122 days  
 The reference Material - cellulose : ~ 100%



**5 Visual Observation of Sample**

Description	Week 1-3	Week 4-6	Week 7-9
Structure	Cut pieces	Cut pieces	Fragmented pieces
Moisture	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level
Colour	White	Dirty	Dirty
Fungal Development	None	None	None
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like

Description	Week 8-12	Week 9-15	week 16-18
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

Contd.,

569

  
 AUTHORIZED SIGNATORY  
 Dr. Radhashyam Giri  
 Technical Officer

  
 AUTHORIZED SIGNATORY  
 Manager (T)

रिपोर्ट सं / **REPORT NO. : 73123**

परीक्षण परिणाम / **TEST RESULTS**

दिनांक / Date :

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 Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

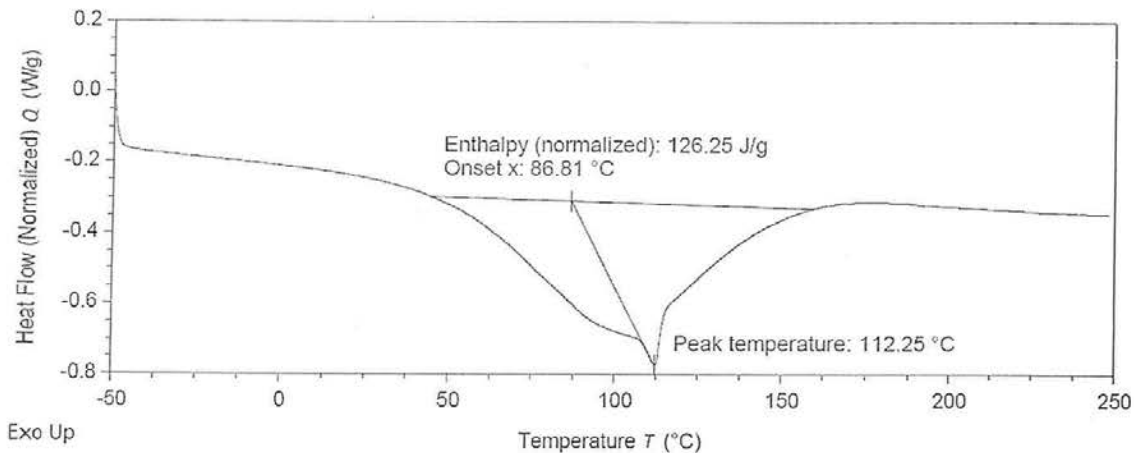
Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

**6 Visual Observation of Compost**

Description	Week 1-3	Week 4-6	Week 7-9
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 8-12	Week 9-15	Week 16-18
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 DSC Analysis**



Contd.,

6 of 7

  
**AUTHORISED SIGNATORY**  
 Dr. Radhashyam Giri  
 Technical Officer

  
**AUTHORISED SIGNATORY**  
 Vishal Verma  
 Manager (T)





रिपोर्ट सं / REPORT NO. : 73123

परीक्षण परिणाम / TEST RESULTS

दिनांक / Date :

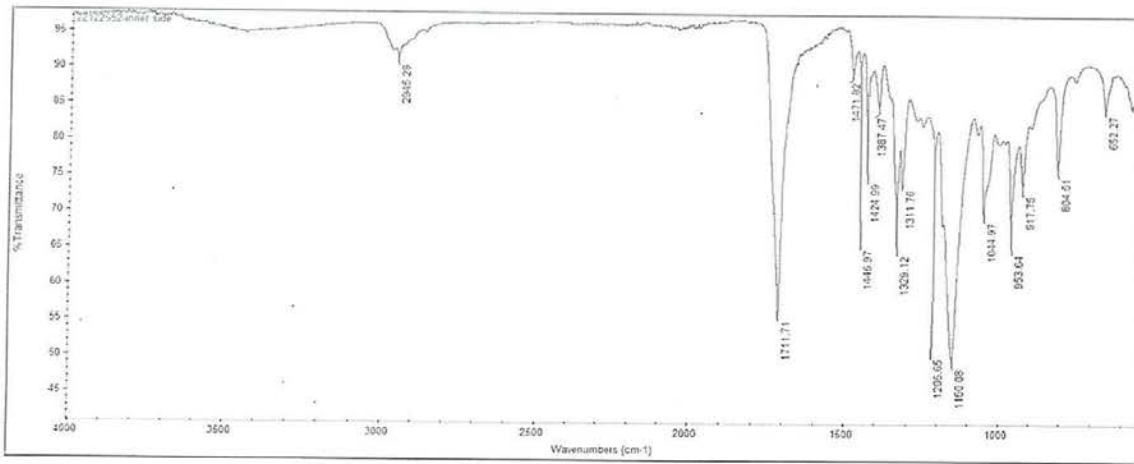
26-06-2023

Issued to: M/s. Huhtamaki Foodservice Packaging India Private Limited ,  
Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

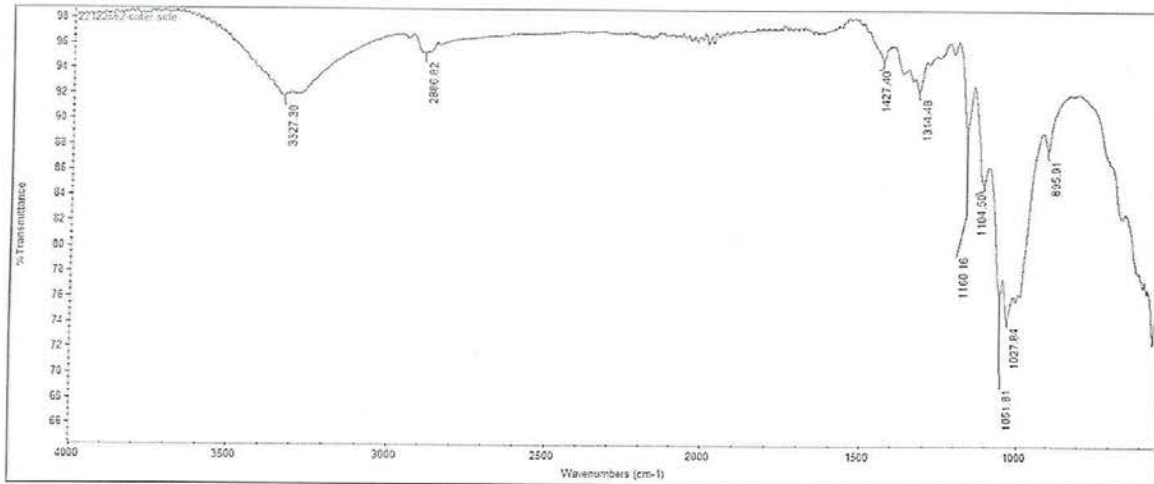
Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

8 FTIR Analysis

Sample Details (As stated by Party): PBS Coated Paper Cup  
Inner side



Outer side



Contd.,

7 of 8

AUTHORISED SIGNATORY  
Dr. Radhashyam Giri  
Technical Officer

AUTHORISED SIGNATORY  
Vishal D. Patil  
Manager (T)

रिपोर्ट सं / REPORT NO. : 73123

परीक्षण परिणाम / TEST RESULTS

दिनांक / Date :

26-06-2023

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Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

### FTIR Interpretation

#### Inner side

Wave number (cm <sup>-1</sup> )	Nature of Bond
2945	C-H stretch in PBS
1711	C=O stretch
1446	C=C stretch
1206	C-H in Plane bend
1150	C-C stretch
1044	C-O stretch
804	C-H bend
652	C-H bend

#### Outer side

Wave number (cm <sup>-1</sup> )	Nature of Bond
3327	O-H stretching
2886	C-H stretch in PBS
1427	C=C stretch
1314	C-H in Plane bend
1160	C-C stretch
1027	C-O stretch
895	C-H bend

**Comment:** The above DSC & FTIR analysis indicates the above sample is Paper cup inner side coated with Polybutylene succinate

Contd.,

8 of 9

  
AUTHORISED SIGNATORY  
Technical Officer

  
AUTHORISED SIGNATORY  
Manager (T)

रिपोर्ट सं / REPORT NO. :  
**73123**

परीक्षण परिणाम / TEST RESULTS

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Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

**9 Disintegration After 12 Weeks**



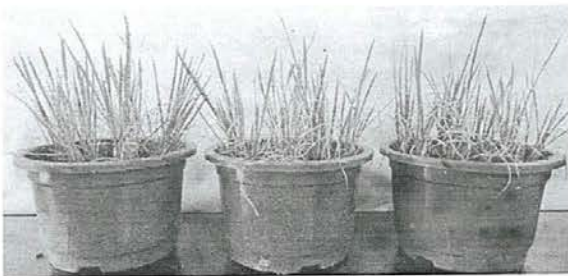
**Before Disintegration**



**After Disintegration**

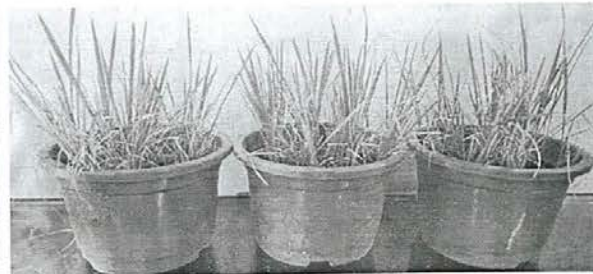
The disintegration of the supplied sample by passing through 2 mm sieve after 12 week in composting condition as per ISO 17088-2021 was found not more than 10% of original dry mass remain.

**10 Plant growth study**



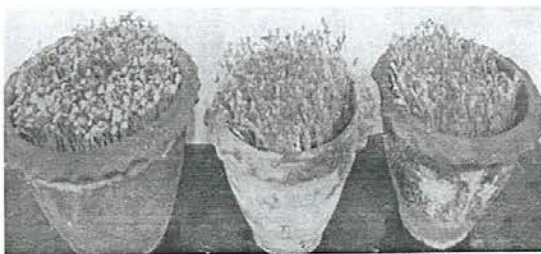
REP-1      REP-2      REP-3

**Fresh compost with Rice seeds**



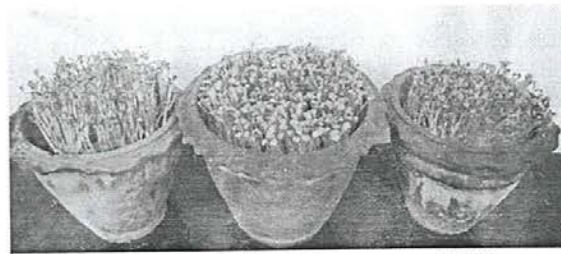
REP-1      REP-2      REP-3

**Bio-degradation tested compost with Rice seeds**



REP-1      REP-2      REP-3

**Fresh compost with Fenugreek seeds**



REP-1      REP-2      REP-3

**Bio-degradation tested compost with Fenugreek seeds**

~~The percentage of seed germination rate is found to be greater than 90% for both Rice and Fenugreek~~

7/9

  
AUTHORISED SIGNATORY  
Technical Officer

  
AUTHORISED SIGNATORY  
Vishal Verma  
Manager (T)



**सिपेट : पेट्रोकेमिकल्स तकनीकी  
संस्थान (आईपीटी)**

(पूर्व में सेंट्रल इंस्टिट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एण्ड टेक्नोलॉजी)  
रसायन एवं पेट्रोसायन 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  
वेबसाइट : www.cipet.gov.in



CIPET सिपेट  
probe - perform - practice - Plastics



**CIPET : INSTITUTE OF PETROCHEMICALS  
TECHNOLOGY (IPT)**

(Formerly Central Institute of Plastics Engineering & Technology)

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/ 22122554

दिनांक/Date: 26-06-2023

प्रति /To,

Huhtamaki Foodservice Packaging India Private Limited  
Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

विषय/Sub : Testing of samples-reg.

संदर्भ/Ref : Your letter no. PO No.HFSIPL/PO/SER/22-23/0002

Dated: 29-11-2022

महोदय,

कृपया हमारी परीक्षण रिपोर्ट क्रमांक प्राप्त करें। Please find enclosed herewith our Test Report no.	73125	दिनांक dated	26-06-2023
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धन्यवाद,

भवदीय

  
प्रबंधक (परीक्षण)

संलग्न : उपर्युक्तानुसार

Encl: 1.a/a.

Remarks:

मुख्यालय : सिपेट, गिण्डी, चेन्नै - 600 032. **Head Office** : CIPET, Guindy, Chennai - 600 032.

केंद्र : अहमदाबाद, अमृतसर, औरंगाबाद, अगरतला, बदी, बालासोर, बेंगलुरु, भोपाल, भुवनेश्वर, चन्द्रपुर, चेन्नई, देहरादून, गुरुग्राम, गुवाहाटी, ग्वालियर, हैदराबाद, हाजीपुर, हल्दिया, इम्फाल, जयपुर, कोच्चि, कोरबा, लखनऊ, मदुरै, मुरथल, मैसूरु, रायपुर, राँची, वलसाड, वाराणसी एवं विजयवाड़ा  
Centres : Ahmedabad, Amritsar, Aurangabad, Agartala, Baddi, Balasore, Bengaluru, Bhopal, Bhubaneswar, Chandrapur, Chennai, Dehradun, Gurugram, Guwahati, Gwalior, Hyderabad, Hajipur, Haldia, Imphal, Jaipur, Kochi, Korba, Lucknow, Madurai, Murthal, Mysuru, Raipur, Ranchi, Valsad, Varanasi & Vijayawada

केंद्रीय पेट्रोसायन अभियांत्रिकी एवं  
प्रौद्योगिकी संस्थान  
पेट्रोकेमिकल्स तकनीकी संस्थान

रसायन एवं पेट्रोसायन विभाग  
रसायन एवं उर्वरक मंत्रालय, भारत सरकार  
गिण्टी, चेन्नै - 600 032.  
फोन : 91-44-2225 4701-6 फैक्स : 91-44-22254707  
ई-मेल : chennai@cipet.gov.in वेबसाइट : www.cipet.gov.in



CIPET सि पेट  
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CENTRAL INSTITUTE OF PETROCHEMICALS  
ENGINEERING & TECHNOLOGY  
INSTITUTE OF PETROCHEMICALS TECHNOLOGY

Department of Chemicals & Petrochemicals  
Ministry of Chemicals & Fertilizers, Govt. of India  
Guindy, Chennai - 600 032.  
Tel : 91-44-2225 4701-6 Fax : 91 - 44 - 22254707  
E-mail : chennai@cipet.gov.in Website : www.cipet.gov.in



परीक्षण रिपोर्ट / TEST REPORT

को जारी /  
Issued to :

**Huhtamaki Foodservice Packaging India Private Limited**  
Survey No.54B, Hissa No.3A, Jangid Commercial  
Point, Dhamangaon Village, Bhiwandi, Thane,  
Maharashtra 421302.

क्र.सं / Sl. No. **32719**

रिपोर्ट सं / REPORT NO. : **73125**

दिनांक / Date : **26-06-2023**

Pages...09...Nos. Part A,B,C & D

संदर्भ / Customer Let. Ref :

PO No. HFSIPL/PO/SER/22- 29-11-2022

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 : Fiber Lids - as stated by the party
- आ) सैपिल प्राप्त होने की तारीख / b) Date of Receipt of sample : 01-12-2022
- 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 : 1.5 kg
- ए) पैकिंग की रीति / h) Mode of Packing : carton packing
- ऐ) मोहर बंद या नहीं / i) Sealed or not : Sealed
- ओ) कोई अन्य सूचना / j) Any other information : --

22122554

**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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*Handwritten signature*

केंद्रीय पेट्रोसायन अभियांत्रिकी एवं  
प्रौद्योगिकी संस्थान  
पेट्रोकेमिकल्स तकनीकी संस्थान

रसायन एवं पेट्रोसायन विभाग  
रसायन एवं उर्वरक मंत्रालय, भारत सरकार  
गिण्टी, चेन्नै - 600 032.  
फोन : 91-44-2225 4701-6 फॅक्स : 91-44-22254707  
ई-मेल : chennai@cipet.gov.in वेबसाइट : www.cipet.gov.in



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CENTRAL INSTITUTE OF PETROCHEMICALS  
ENGINEERING & TECHNOLOGY  
INSTITUTE OF PETROCHEMICALS TECHNOLOGY

Department of Chemicals & Petrochemicals  
Ministry of Chemicals & Fertilizers, Govt. of India  
Guindy, Chennai - 600 032.  
Tel : 91-44-2225 4701-6 Fax : 91 - 44 - 22254707  
E-mail : chennai@cipet.gov.in Website : www.cipet.gov.in

परीक्षण रिपोर्ट / TEST REPORT

रिपोर्ट सं / REPORT NO. :

73125

32719

26-06-2023

क्र.सं / Sl. No.

दिनांक / Date :

भाग - ग / PART - C

परीक्षण परिणाम / TEST RESULTS

Test Duration: 09.12.2022 to 26.06.2023

Sl.No	Name of the Test	Test Method/ Standard	Unit	Results Obtained	Specified Requirements
1	Material Identification	FTIR & DSC	-	Cellulose	-
2	Disintegration (Dry mass remains in 2 mm sieve after 84 days)	ISO 17088:2021	%	6.9	No more than 10%
3	Ultimate aerobic Biodegradation (with reference to 100% degradation of positive reference)	ISO 17088:2021	%	91.8 (at the end of 122 days)	> 90 (at the end of the test period not more than 180 days.)
4	Plant Growth study				
	Monocotyledon (Rice) % Seed emergence	ISO 17088:2021 Cl.6.4.3	%	97	> 90
	Dicotyledon (Fenugreek) % Seed Emergence		%	95	> 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	%	100	> 90
b	Survival of adult earthworm at the end of 14 days			95	> 90
c	Biomass end of the 14 days			95	> 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	%	95	> 90
b	Survival of adult earthworm at the end of 56 days			95	> 90
c	Offspring at the end of 56 days			95	> 90
d	Biomass end of the 56 days			94	> 90

The detailed observation on biodegradability test is enclosed as Annexure

Contd.

Issued to:

M/s. Huhamaki Foodservice Packaging India Private Limited,  
Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

Ref. PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

2 of 9

*Dr. Radhashyam Giri*

AUTHORISED SIGNATORY  
Dr. Radhashyam Giri  
Technical Officer

*Vishal Verma*

AUTHORISED SIGNATORY  
Vishal Verma  
Manager (T)



रिपोर्ट सं / REPORT NO. : 73125

परीक्षण परिणाम / TEST RESULTS

दिनांक / Date : 26-06-2023

Issued to: M/s. Huhtamaki Foodservice Packaging India Private Limited ,  
Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

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)			1.83	10
b.	Copper (Cu)			1.508	300
c.	Nickel (Ni)			2.423	50
d.	Zinc (Zn)			4.305	1000
e.	Cobalt (Co)	ISO 17088:2021	mg/kg	0.968	-
f.	Chromium (Cr)			2.573	50
g.	Molybdenum (Mo)			8.123	-
h.	Mercury (Hg)			0.005	0.15
i.	Cadmium (Cd)			0.023	5
j.	Lead (Pb)			1.17	100
k.	Selenium (Se)			0.098	-

\* 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.

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 from the date of issue.
6. Subcontracted Tests (if any): Nil

Contd.,

399

  
AUTHORISED SIGNATORY  
Technical Officer

  
AUTHORISED SIGNATORY  
Manager (I)

रिपोर्ट सं / REPORT NO. 73125

परीक्षण परिणाम / TEST RESULTS

दिनांक / Date : 26-06-2023

Issued to: M/s. Huhtamaki Foodservice Packaging India Private Limited ,  
Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.  
Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

OBSERVATION FOR BIODEGRADABILITY TEST AS PER ISO 17088:2021

- 1 Sample Details (As stated by Party): Fiber Lids
- 2 Material Identification by FTIR : Cellulose

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 (°C)	: 58
Dry Solid (%)	: 54.8
Volatile content (%)	: 16.9
CO <sub>2</sub> evolved during first 10days in blank	: 55.44 mg/g
Test duration (days)	: 122 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	7.2	7.1
2	Blank 2	7.3	7.1
3	Blank 3	7.4	7.1
4	Cellulose 1	7.2	7.1
5	Cellulose 2	7.2	7.1
6	Cellulose 3	7.4	7.2
7	Negative 1	7.4	7.2
8	Negative 2	7.3	7.3
9	Negative 3	7.3	7.2
10	Sample 1	7.4	7.2
11	Sample 2	7.3	7.2
12	Sample 3	7.3	7.2

Contd.,

4 of 5

  
AUTHORISED SIGNATORY  
Dr. Ranashyam Giri  
Technical Officer

  
AUTHORISED SIGNATORY  
Vishal Vemba  
Manager (T)

रिपोर्ट सं / REPORT NO. : 73125

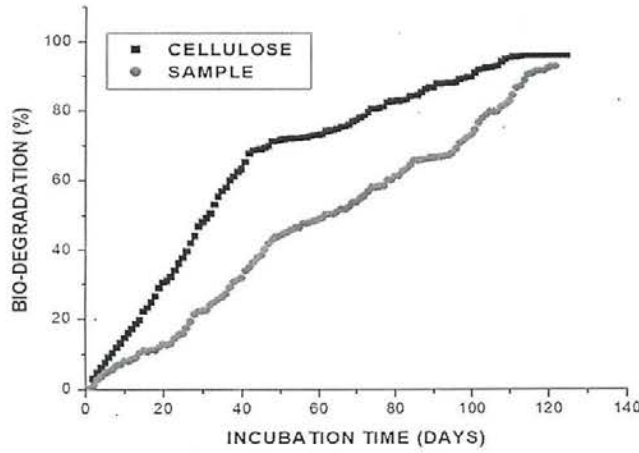
परीक्षण परिणाम / TEST RESULTS

दिनांक / Date : 26-06-2023

Issued to: M/s. Huhtamaki Foodservice Packaging India Private Limited,  
Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

- 4 Result: Percentage biodegradation relative to positive reference  
Sample (Mean) : 91.8 % at the end of 122 days  
The reference Material - cellulose : ~ 100%



5 Visual Observation of Sample

Description	Week 1-3	Week 4-6	Week 7-9
Structure	Cut pieces	Cut pieces	Fragmented pieces
Moisture	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level
Colour	White	Dirty	Dirty
Fungal Development	None	None	None
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like

Description	Week 10-12	Week 13-15	week 16-18
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

Contd.,

597

  
AUTHORISED SIGNATORY  
Technical Officer

  
AUTHORISED SIGNATORY  
Manager (T)



रिपोर्ट सं / REPORT NO. :  
73125

परीक्षण परिणाम / TEST RESULTS

दिनांक / Date :  
26-06-2023

Issued to: M/s. Huhtamaki Foodservice Packaging India Private Limited,  
Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

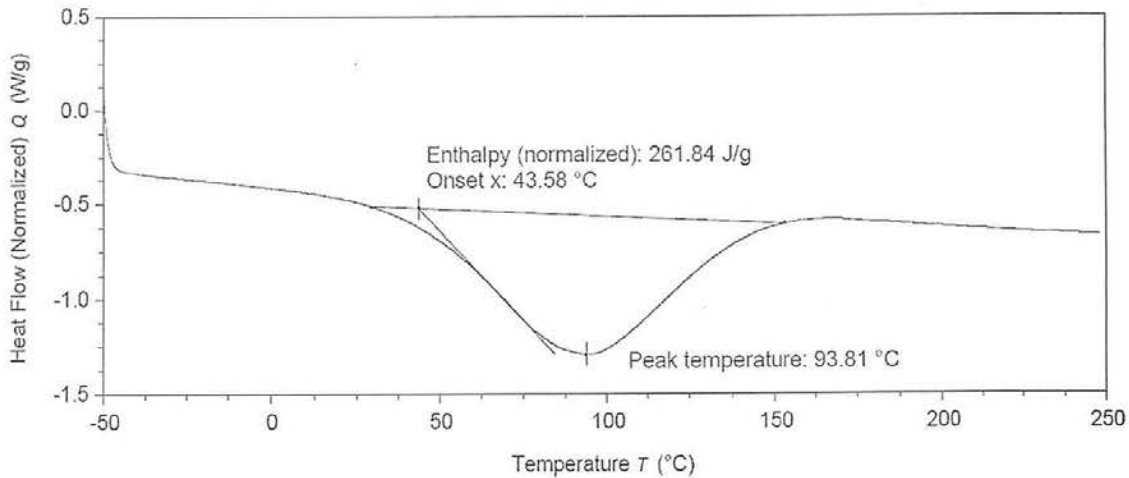
Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

## 6 Visual Observation of Compost

Description	Week 1-3	Week 4-6	Week 7-9
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 10-12	Week 13-15	week 16-18
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 DSC Analysis



Contd.,

6 of 7

  
AUTHORISED SIGNATORY  
Dr. Radhashyam Giri  
Technical Officer

  
AUTHORISED SIGNATORY  
Vishal Venis  
Manager (T)

रिपोर्ट सं / REPORT NO. 73125

परीक्षण परिणाम / TEST RESULTS

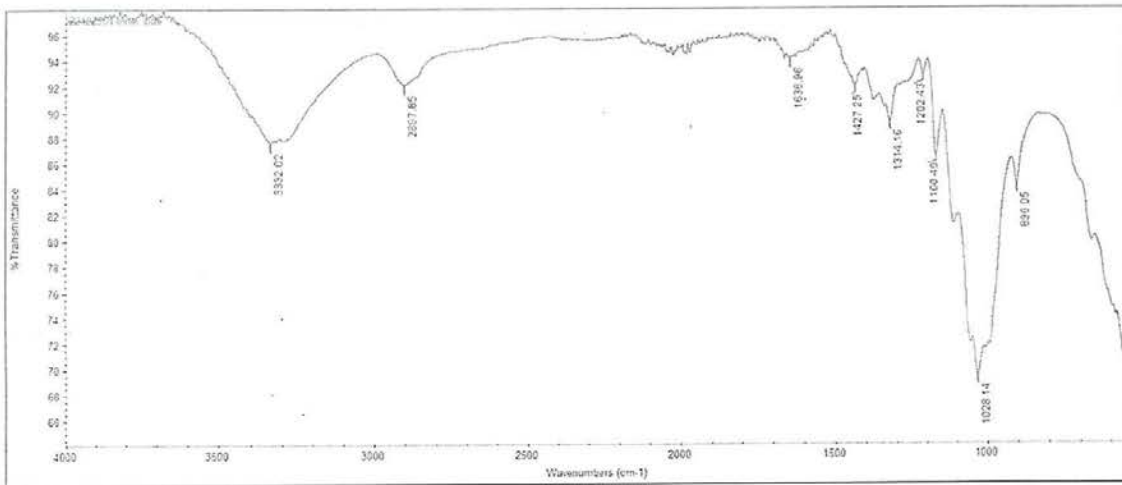
दिनांक / Date : 26-06-2023

Issued to: M/s. Huhtamaki Foodservice Packaging India Private Limited ,  
Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

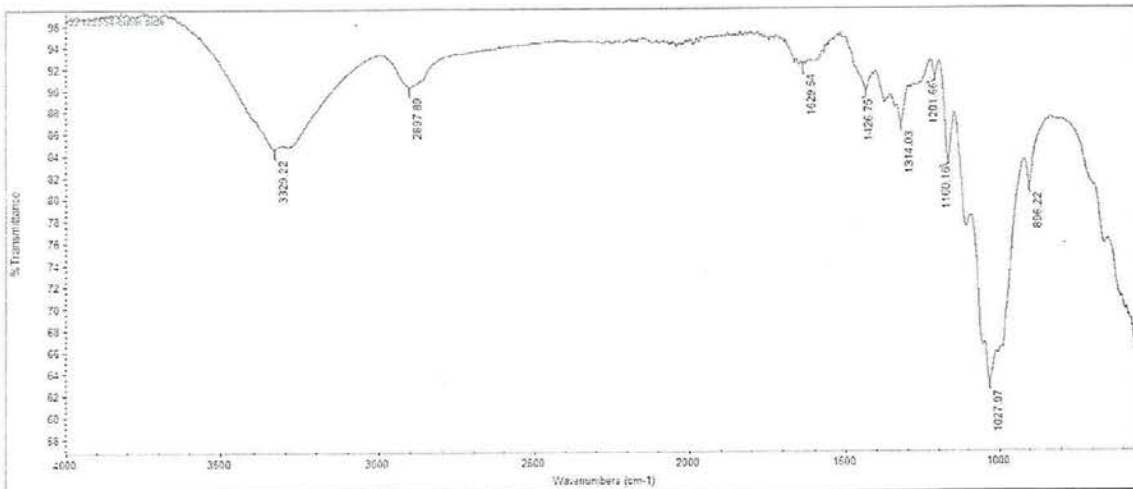
Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

8 FTIR Analysis  
Sample Details (As stated by Party): Fiber Lids

Inner side



Outer side



Contd.,

799

  
AUTHORISED SIGNATORY  
Dr. Kanchashyam Giri  
Technical Officer

  
AUTHORISED SIGNATORY  
Vishal Verma  
Manager (T)

सिपेट : आई पी टी -चेन्नै-32.  
CIPET : IPT - Chennai-32.



Continuation Sheet

रिपोर्ट सं / REPORT NO. : 73125

परीक्षण परिणाम / TEST RESULTS

दिनांक / Date : 26-06-2023

Issued to: M/s. Huhtamaki Foodservice Packaging India Private Limited,  
Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

### FTIR Interpretation

Inner side

Wave number (cm <sup>-1</sup> )	Nature of Bond
3332	O-H stretching in cellulose
2897	C-H stretch
1427	C=O stretch
1314	C=C stretch
1202	C-H in Plane bend
1160	C-C stretch
1012	C-O stretch
896	C-H bend

Outer side

Wave number (cm <sup>-1</sup> )	Nature of Bond
3329	O-H stretching in cellulose
2897	C-H stretch
1629	C=O stretch
1426	C=C stretch
1314	C-H in Plane bend
1160	C-C stretch
1027	C-O stretch
896	C-H bend
726	C-H bend

**Comment:** The above DSC & FTIR analysis indicates the above sample is Cellulose

Contd.,

8/9

  
AUTHORISED SIGNATORY  
Dr. Radhashyam Giri  
Technical Officer

  
AUTHORISED SIGNATORY  
Vishal Verma  
Manager (T)



रिपोर्ट सं / REPORT NO. 73125

परीक्षण परिणाम / TEST RESULTS

दिनांक / Date : 26-06-2023

Issued to: M/s. Huhtamaki Foodservice Packaging India Private Limited ,  
Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.  
Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

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 Plant growth study



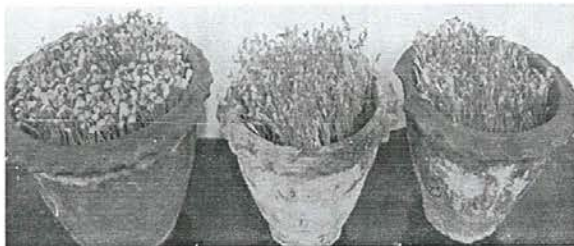
REP-1 REP-2 REP-3

Fresh compost with Rice seeds



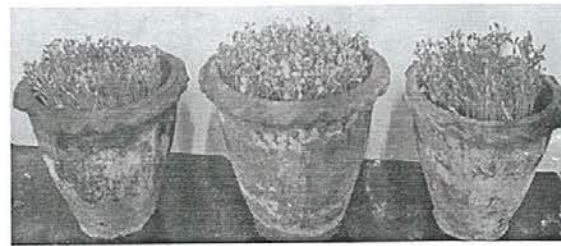
REP-1 REP-2 REP-3

Bio-degradation tested compost with Rice seeds



REP-1 REP-2 REP-3

Fresh compost with Fenugreek seeds



REP-1 REP-2 REP-3

Bio-degradation tested compost with Fenugreek seeds

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

7/17

  
AUTHORISED SIGNATORY  
Dr. Rameshwar Gin  
Technical Officer

  
AUTHORISED SIGNATORY  
Manager (T)

**सिपेट : पेट्रोकेमिकल्स तकनीकी  
संस्थान (आईपीटी)**

(पूर्व में सेन्ट्रल इंस्टिट्यूट ऑफ प्लास्टिक्स इंजीनियरिंग एण्ड टेक्नोलॉजी)  
रसायन एवं पेट्रोसायन विभाग  
रसायन एवं उर्वरक मंत्रालय, भारत सरकार  
गिण्टी, चेन्नै - 600 032.  
फ़ोन : 91-44-2225 4701 (6 लाइन)  
फ़ैक्स : 91-44-22254707  
ई-मेल : chennai@cipet.gov.in  
वेबसाइट : www.cipet.gov.in



**CIPET सिपेट**  
probe - perform - practice - Plastics



**CIPET : INSTITUTE OF PETROCHEMICALS  
TECHNOLOGY (IPT)**

(Formerly Central Institute of Plastics Engineering & Technology)

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/ 22122553

दिनांक/Date: 26-06-2023

प्रति /To,

Huhtamaki Foodservice Packaging India Private Limited  
Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

विषय/Sub : Testing of samples-reg.

संदर्भ/Ref : Your letter no. PO No.HFSIPL/PO/SER/22-23/0002

Dated: 29-11-2022

महोदय,

कृपया हमारी परीक्षण रिपोर्ट क्रमांक प्राप्त करें। Please find enclosed herewith our Test Report no.	73124	दिनांक dated	26-06-2023
--	-------	-----------------	------------

धन्यवाद,

भवदीय

प्रबंधक (परीक्षण)

संलग्न : उपर्युक्तानुसार

Encl:1.a/a.

Remarks:

**मुख्यालय** : सिपेट, गिण्टी, चेन्नै - 600 032. **Head Office** : CIPET, Guindy, Chennai - 600 032.

**केन्द्र** : अहमदाबाद, अमृतसर, औरंगाबाद, अगरतला, बर्ही, बालासोर, बेंगलुरु, भोपाल, भुवनेश्वर, चन्द्रपुर, चेन्नई, देहरादून, गुरुग्राम, गुवाहाटी, ग्वालियर, हैदराबाद, हाजीपुर, हल्दिया, इम्फाल, जयपुर, कोच्चि, कोरबा, लखनऊ, मदुरै, मुरथल, मैसूरु, रायपुर, राँची, वलसाड, वाराणसी एवं विजयवाड़ा  
**Centres** : Ahmedabad, Amritsar, Aurangabad, Agartala, Baddi, Balasore, Bengaluru, Bhopal, Bhubaneswar, Chandrapur, Chennai, Dehradun, Gurugram, Guwahati, Gwalior, Hyderabad, Hajipur, Haldia, Imphal, Jaipur, Kochi, Korba, Lucknow, Madurai, Murthal, Mysuru, Raipur, Ranchi, Valsad, Varanasi & Vijayawada

केंद्रीय पेट्रोसायन अभियांत्रिकी एवं  
प्रौद्योगिकी संस्थान  
पेट्रोकेमिकल्स तकनीकी संस्थान

रसायन एवं पेट्रोसायन विभाग  
रसायन एवं उर्वरक मंत्रालय, भारत सरकार  
गिण्टी, चेन्नै - 600 032.  
फोन : 91-44-2225 4701-6 फैक्स : 91-44-22254707  
ई-मेल : chennai@cipet.gov.in वेबसाइट : www.cipet.gov.in



CIPET सि पी ई  
petro - petchem - petchem - petchem



CENTRAL INSTITUTE OF PETROCHEMICALS  
ENGINEERING & TECHNOLOGY  
INSTITUTE OF PETROCHEMICALS TECHNOLOGY

Department of Chemicals & Petrochemicals  
Ministry of Chemicals & Fertilizers, Govt. of India  
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E-mail : chennai@cipet.gov.in Website : www.cipet.gov.in

परीक्षण रिपोर्ट / TEST REPORT

को जारी /  
Issued to :

**Huhtamaki Foodservice Packaging India Private Limited**  
Survey No.54B, Hissa No.3A, Jangid Commercial  
Point, Dhamangaon Village, Bhiwandi, Thane,  
Maharashtra 421302.

क्र.सं / Sl. No. **32718**

रिपोर्ट सं / REPORT NO. : **73124**

दिनांक / Date : **26-06-2023**

Pages.....**07**...Nos. Part A,B,C & D

संदर्भ / Customer Let. Ref : PO No.HFSIPL/PO/SER/22- 29-11-2022  
परीक्षण मानक स्तर के अनुसार परीक्षण 3/3/2023 TEST REPORT AS PER TEST STANDARD : Refer Part C

**भाग - क / PART - A**

**प्रस्तुत सैंपल का विवरण / PARTICULARS OF SAMPLE SUBMITTED**

- अ) सैंपल का नाम / a) Name of the Sample : PLA Lids - as stated by the party
- आ) सैंपल प्राप्त होने की तारीख / b) Date of Receipt of sample : 01-12-2022
- 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 : 1.5 kg
- ए) पैकिंग की रीति / h) Mode of Packing : carton packing
- ऐ) मोहर बंद या नहीं / i) Sealed or not : Sealed
- ओ) कोई अन्य सूचना / j) Any other information : --

22122553

**भाग - ख / PART - B**

**अनुपूरक सूचनाएँ / SUPPLEMENTARY INFORMATIONS**

- अ) सैंपलिंग 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

*PP*

*[Signature]*



केंद्रीय पेट्रोसायन अभियांत्रिकी एवं  
प्रौद्योगिकी संस्थान  
पेट्रोकेमिकल्स तकनीकी संस्थान

रसायन एवं पेट्रोसायन विभाग  
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CENTRAL INSTITUTE OF PETROCHEMICALS  
ENGINEERING & TECHNOLOGY  
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Department of Chemicals & Petrochemicals  
Ministry of Chemicals & Fertilizers, Govt. of India  
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परीक्षण रिपोर्ट / TEST REPORT  
73124

रिपोर्ट सं / REPORT NO. :  
26-06-2023

क्र.सं / Sl. No. 32718

दिनांक / Date :

भाग - ग / PART - C

परीक्षण परिणाम / TEST RESULTS

Test Duration: 09.12.2022 to 26.06.2023

Sl.No	Name of the Test	Test Method/ Standard	Unit	Results Obtained	Specified Requirements
1	Material Identification	FTIR & DSC	-	Poly Lactic Acid	-
2	Disintegration (Dry mass remains in 2 mm sieve after 84 days)	ISO 17088:2021	%	9.1	No more than 10%
3	Ultimate aerobic Biodegradation (with reference to 100% degradation of positive reference)	ISO 17088:2021	%	91.2 (at the end of 124 days)	> 90 (at the end of the test period not more than 180 days.)
4	Plant Growth study				
	Monocotyledon (Rice) % Seed emergence	ISO 17088:2021 Cl.6.4.3	%	92	> 90
	Dicotyledon (Fenugreek) % Seed Emergence		%	96	> 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	%	100	> 90
b	Survival of adult earthworm at the end of 14 days			98	> 90
c	Biomass end of the 14 days			99	> 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	%	95	> 90
b	Survival of adult earthworm at the end of 56 days			95	> 90
c	Offspring at the end of 56 days			95	> 90
d	Biomass end of the 56 days			96	> 90

The detailed observation on biodegradability test is enclosed as Annexure

Contd.

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Survey No.54B, Hissa No.3A, Jangid Commercial Point,  
Dhamangaon Village, Bhiwandi, Thane, Maharashtra 421302.

Ref. PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

2 of 8

  
AUTHORISED SIGNATORY  
Dr. Radhashyam Giri  
Technical Officer

  
AUTHORISED SIGNATORY  
Vishal Verma  
Manager (T)

रिपोर्ट सं / REPORT NO. : 73124

परीक्षण परिणाम / TEST RESULTS

दिनांक / Date : 26-06-2023

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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)			6.09	10
b.	Copper (Cu)			1.793	300
c.	Nickel (Ni)			2.708	50
d.	Zinc (Zn)			6.015	1000
e.	Cobalt (Co)	ISO 17088:2021	mg/kg	1.035	-
f.	Chromium (Cr)			2.775	50
g.	Molybdenum (Mo)			2.13	-
h.	Mercury (Hg)			0.005	0.15
i.	Cadmium (Cd)			0.038	5
j.	Lead (Pb)			1.403	100
k.	Selenium (Se)			0.098	-

\* 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.

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 from the date of issue.
6. Subcontracted Tests (if any): Nil

Contd.,

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AUTHORISED SIGNATORY  
Dr. Radhashyam Giri  
Technical Officer

  
AUTHORISED SIGNATORY  
Manager (T)

रिपोर्ट सं / REPORT NO. 73124

परीक्षण परिणाम / TEST RESULTS

दिनांक / Date : 26-06-2023

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OBSERVATION FOR BIODEGRADABILITY TEST AS PER ISO 17088:2021

- 1 Sample Details (As stated by Party): PLA Lids
- 2 Material Identification by FTIR : Poly Lactic Acid

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 (°C) : 58  
Dry Solid (%) : 54.8  
Volatile content (%) : 16.9  
CO<sub>2</sub> evolved during first 10days in blank : 55.44 mg/g  
Test duration (days) : 124 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	7.4	7.2
2	Blank 2	7.4	7.3
3	Blank 3	7.3	7.2
4	Cellulose 1	7.3	7.3
5	Cellulose 2	7.2	7.1
6	Cellulose 3	7.2	7.1
7	Negative 1	7.4	7.2
8	Negative 2	7.1	7.1
9	Negative 3	7.2	7.1
10	Sample 1	7.2	7.1
11	Sample 2	7.2	7.1
12	Sample 3	7.5	7.1

Contd.,

4 of 8

  
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Technical Officer

  
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Manager (T)



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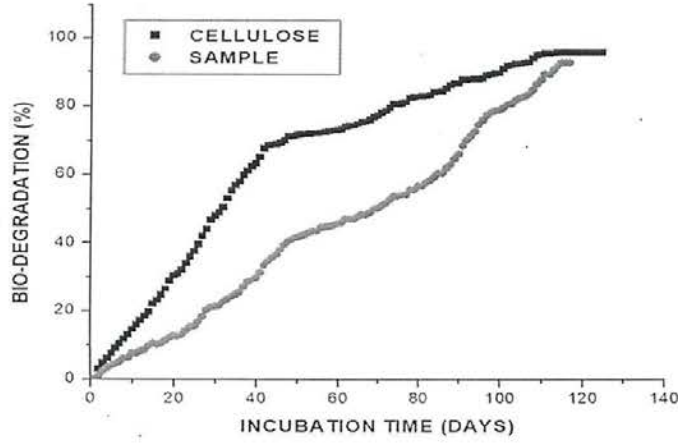
परीक्षण परिणाम / TEST RESULTS

दिनांक / Date : 26-06-2023

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- 4 Result: Percentage biodegradation relative to positive reference  
Sample (Mean) : 91.2 % at the end of 124 days  
The reference Material - cellulose : ~ 100%



- 5 Visual Observation of Sample

Description	Week 1-3	Week 4-6	Week 7-9
Structure	Cut pieces	Cut pieces	Fragmented pieces
Moisture	Adequate moisture Level	Adequate moisture Level	Adequate moisture Level
Colour	White	Dirty	Dirty
Fungal Development	None	None	None
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like

Description	Week 10-12	Week 13-15	week 16-18
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

Contd.,

5 of 8

  
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रिपोर्ट सं / REPORT NO. **73124**

परीक्षण परिणाम / TEST RESULTS

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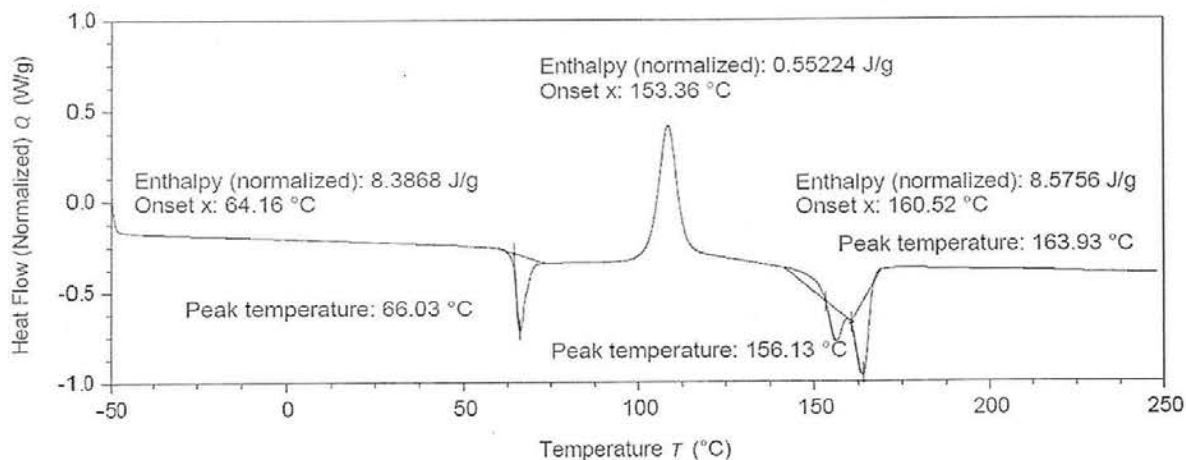
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**6 Visual Observation of Compost**

Description	Week 1-3	Week 4-6	Week 7-9
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 10-12	Week 13-15	Week 16-18
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 DSC Analysis**



Contd.,

6 of 8

  
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Manager (T)

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परीक्षण परिणाम / TEST RESULTS

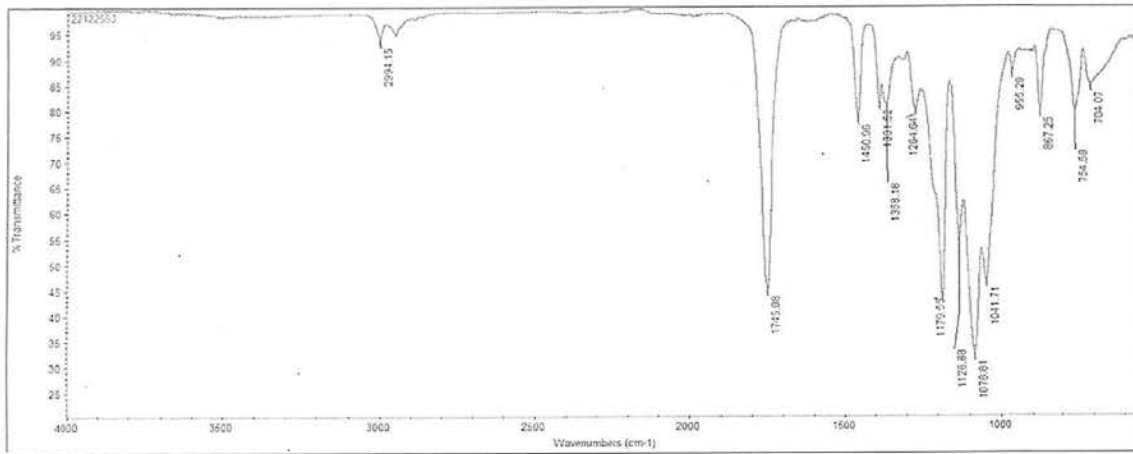
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Customer Letter Ref. No.: PO No. HFSIPL/PO/SER/22-23/0002, dtd. 29-11-2022

**8 FTIR Analysis**

Sample Details (As stated by Party): **PLA Lids**



**FTIR Interpretation**

Wave number (cm <sup>-1</sup> )	Nature of Bond
3314	O-H stretching
2927	C-H stretch
1711	C=O stretch in PLA
1457	C=C stretch
1286	C-H in Plane bend
1102	C-C stretch
1015	C-O stretch
872	C-H bend
726	C-H bend

**Comment:** The above DSC & FTIR analysis indicates the above sample is Poly Lactic Acid

Contd.,

7 of 8

  
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रिपोर्ट सं / REPORT NO. **73124**

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**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.

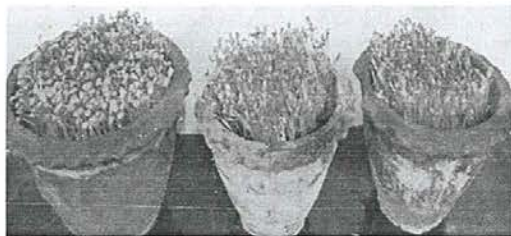
**10 Plant growth study**



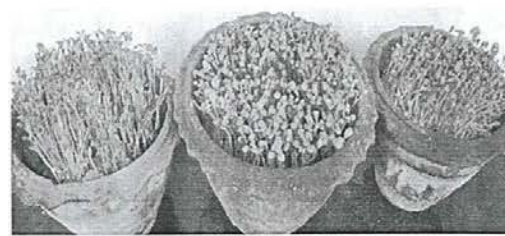
Fresh compost with Rice seeds



Bio-degradation tested compost with Rice seeds



Fresh compost with Fenugreek seeds



Bio-degradation tested compost with Fenugreek seeds

The percentage of seed germination rate is found to be greater than 90% for both Rice and Fenugreek 8/4

  
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