सिपेट : पेट्रोकेमिकल्स उन्नत अनुसंधान स्कूल (एस ए आर पी) – ए आर एस टी पी एस
रसायन एवं पेट्रोरसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार
टी वी के इंडस्ट्रियल एस्टेट, गिण्डी, चेन्नै – 600 032
फोन : +91-44-22254794
ई-मेल : arstps@cipet.gov.in / arstpscipet@gmail.com
वेब्साइट : www.cipet.gov.in / www.arstps.gov.in
मुख्यालय : सिपेट, गिण्डी, चेन्नै – 600 032.

CIPET सि पे ट
probe · perform · practice · Plastics

CIPET : SCHOOL FOR ADVANCED RESEARCH IN PETROCHEMICALS (SARP) - ARSTPS
Department of Chemicals & Petrochemicals,
Ministry of Chemicals & Fertilizers, Govt. of India
T.V.K. Industrial Estate, Guindy, Chennai - 600 032.
Phone : +91-44-2225 4794
e-Mail : arstps@cipet.gov.in / arstpscipet@gmail.com
Website : www.cipet.gov.in / www.arstps.gov.in
Head office : CIPET, Guindy, Chennai - 600 032

TR No. PVT/155 **Date: 02.11.2021**

OBSERVATION FOR BIODEGRADABILITY TEST AS PER ISO 17088:2012/IS 17088:2008

Name of the Party : [redacted]

1 **Sample Details (As stated by Party):** Rectangle Take Away Hinge Box with Lid: Sugarcane Bagasse Pulp Molded Articles

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±2
Dry Solid (%)	:	52.6
Volatile content (%)	:	13.9
CO_2 evolved during first 10days in blank vessels (mg/g of volatile content of compost)	:	82.3
Test duration (days)	:	84
Reference material	:	Cellulose
Volume of reaction vessel (mL)	:	3000

(ii) pH of test medium :

S.No.	Compost Vessel	pH (Before)	pH (After)
1	Blank 1	7.6	7.8
2	Blank 2	7.8	7.8
3	Blank 3	7.9	7.7
4	Cellulose 1	7.8	7.9
5	Cellulose 2	7.6	7.6
6	Cellulose 3	7.6	7.8
7	Negative 1	7.8	7.4
8	Negative 2	7.7	7.6
9	Negative 3	7.7	7.6
10	Sample 1	8.0	7.3
11	Sample 2	7.8	7.1
12	Sample 3	7.9	7.4

02/11/21
AUTHORIZED SIGNATORY
B. RAVI

2/11/2021
AUTHORIZED SIGNATORY
Dr. K.P. BHUVANA

सिपेट : पेट्रोकेमिकल्स उन्नत अनुसंधान स्कूल (एस ए आर पी) – ए आर एस टी पी एस
रसायन एवं पेट्रोरसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार
टी वी के इंडस्ट्रियल एस्टेट, गिण्डी, चेन्नै – 600 032
फोन : +91-44-22254794
ई-मेल : arstps@cipet.gov.in / arstpscipet@gmail.com
वेब्साइट : www.cipet.gov.in / www.arstps.gov.in
मुख्यालय : सिपेट, गिण्डी, चेन्नै – 600 032.

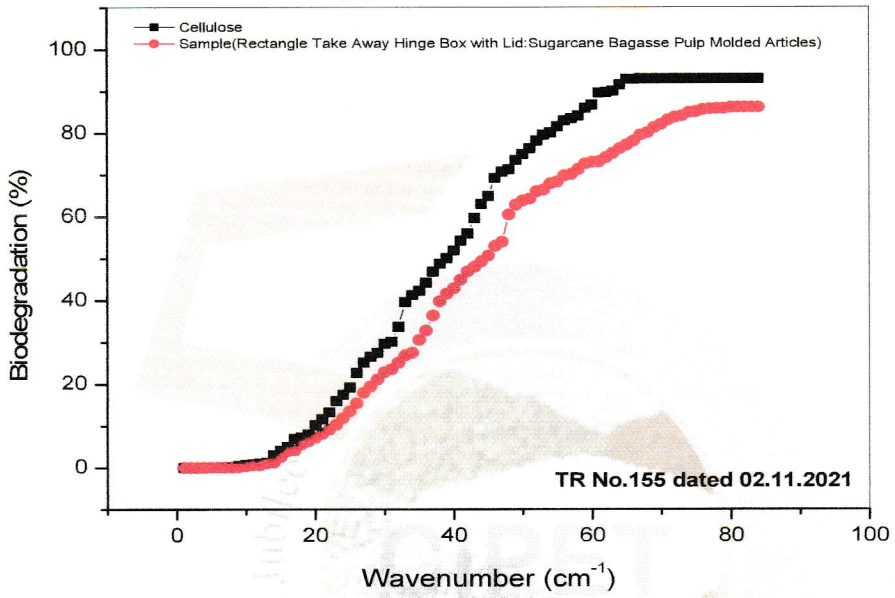
CIPET सि पे ट
probe · perform · practice · Plastics

CIPET : SCHOOL FOR ADVANCED RESEARCH IN PETROCHEMICALS (SARP) - ARSTPS
Department of Chemicals & Petrochemicals,
Ministry of Chemicals & Fertilizers, Govt. of India
T.V.K. Industrial Estate, Guindy, Chennai - 600 032.
Phone : +91-44-2225 4794
e-Mail : arstps@cipet.gov.in / arstpscipet@gmail.com
Website : www.cipet.gov.in / www.arstps.gov.in
Head office : CIPET, Guindy, Chennai - 600 032

TR No. PVT/155 **Date: 02.11.2021**

4 Result: Percentage biodegradation relative to positive reference

Sample (Mean)	:	92.6 (at the end of 84 days)
The reference Material - cellulose	:	~ 100%



5 Visual Observation of Sample

Description	Week 2	Week 4	Week 6
Structure	Cut pieces	Cut pieces	Fragmented pieces
Moisture	Appropriate moisture Level	Appropriate moisture Level	Appropriate moisture Level
Colour	White	Dirty white	-
Fungal Development	None	None	None
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like

Description	Week 8	Week 10	Week 12
Structure	Fragmented film	-	-
Moisture	Appropriate moisture Level	Appropriate moisture Level	Appropriate moisture Level
Colour	-	-	-
Fungal Development	None	None	None
Smell	Organic/dirt like	Organic/dirt like	Organic/dirt like

02/11/21

AUTHORIZED SIGNATORY
B. RAVI

2/11/2021

AUTHORIZED SIGNATORY
Dr. K.P. BHUVANA

सिपेट : पेट्रोकेमिकल्स उन्नत अनुसंधान स्कूल (एस ए आर पी) – ए आर एस टी पी एस
रसायन एवं पेट्रोरसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार
टी वी के इंडस्ट्रियल एस्टेट, गिण्डी, चेन्नै – 600 032
फोन : +91-44-22254794
ई-मेल : arstps@cipet.gov.in / arstpscipet@gmail.com
वेब्साइट : www.cipet.gov.in / www.arstps.gov.in
मुख्यालय : सिपेट, गिण्डी, चेन्नै – 600 032.

CIPET सि पे ट
probe · perform · practice · Plastics

CIPET : SCHOOL FOR ADVANCED RESEARCH IN PETROCHEMICALS (SARP) - ARSTPS
Department of Chemicals & Petrochemicals,
Ministry of Chemicals & Fertilizers, Govt. of India
T.V.K. Industrial Estate, Guindy, Chennai - 600 032.
Phone : +91-44-2225 4794
e-Mail : arstps@cipet.gov.in / arstpscipet@gmail.com
Website : www.cipet.gov.in / www.arstps.gov.in
Head office : CIPET, Guindy, Chennai - 600 032

TR No. PVT/155

Date: 02.11.2021

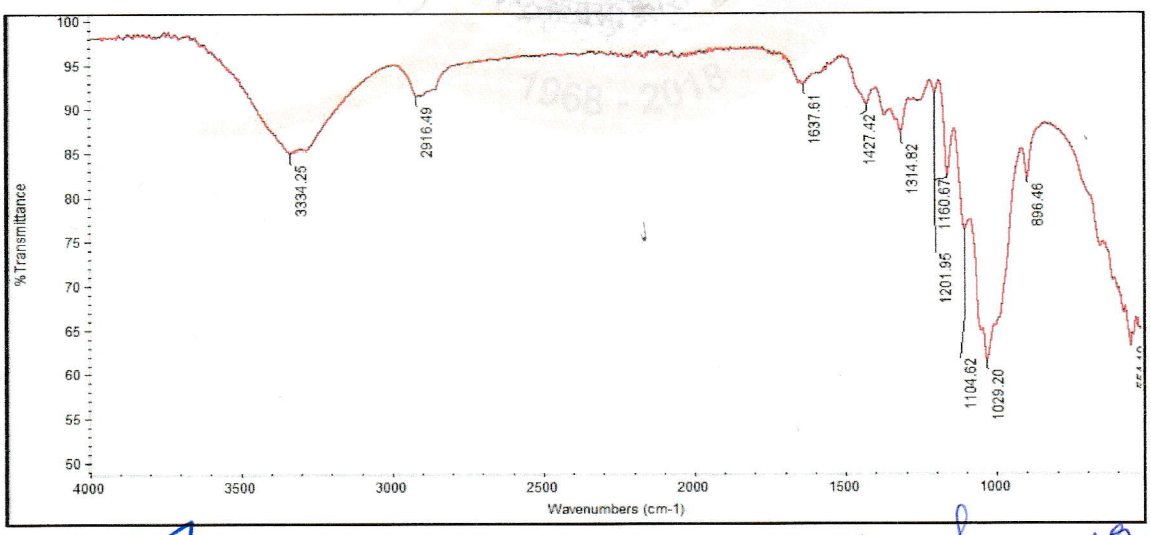
6 Visual Observation of Compost

Description	Week 2	Week 4	Week 6
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	Week 10	Week 12
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): Rectangle Take Away Hinge Box with Lid: Sugarcane Bagasse Pulp Molded Articles



02/11/21

AUTHORIZED SIGNATORY
B. RAVI

2/11/2021

AUTHORIZED SIGNATORY
Dr. K.P. BHUVANA

सिपेट : पेट्रोकेमिकल्स उन्नत अनुसंधान स्कूल (एस ए आर पी) – ए आर एस टी पी एस
रसायन एवं पेट्रोरसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार
टी वी के इंडस्ट्रियल एस्टेट, गिण्डी, चेन्नै – 600 032
फोन : +91-44-22254794
ई-मेल : arstps@cipet.gov.in / arstpscipet@gmail.com
वेब्साइट : www.cipet.gov.in / www.arstps.gov.in
मुख्यालय : सिपेट, गिण्डी, चेन्नै – 600 032.

CIPET सि पे ट
probe · perform · practice · Plastics

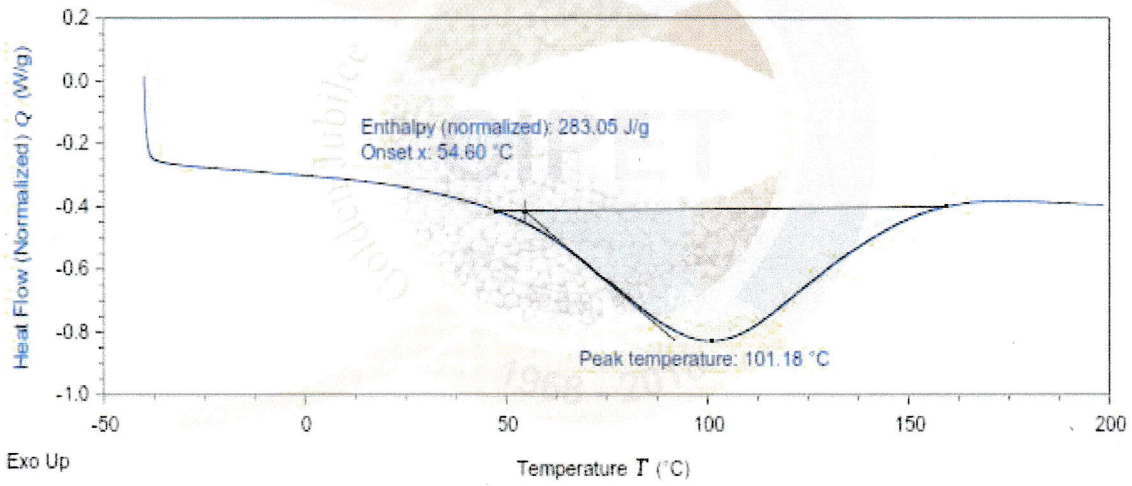
CIPET : SCHOOL FOR ADVANCED RESEARCH IN PETROCHEMICALS (SARP) - ARSTPS
Department of Chemicals & Petrochemicals,
Ministry of Chemicals & Fertilizers, Govt. of India
T.V.K. Industrial Estate, Guindy, Chennai - 600 032.
Phone : +91-44-2225 4794
e-Mail : arstps@cipet.gov.in / arstpscipet@gmail.com
Website : www.cipet.gov.in / www.arstps.gov.in
Head office : CIPET, Guindy, Chennai - 600 032

TR No. PVT/155 **Date: 02.11.2021**

FTIR Interpretation

Wave number (cm^{-1})	Nature of Bond
3334	O-H covalent bond
2916	C-H stretching
1637	O-H vibrations
1427	CH_2 symmetric vibration
1314	CH_2 wagging
1201	C-OH in-plane
1029	C-O
896	C-O-C

8 DSC Analysis



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

02/11/21
AUTHORIZED SIGNATORY
B. RAVI

2/11/2021
AUTHORIZED SIGNATORY
Dr. K.P. BHUVANA

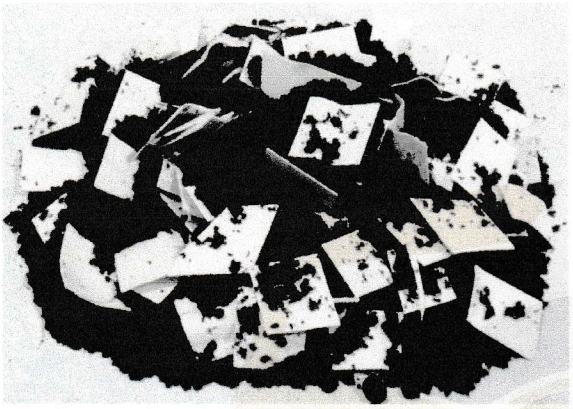
सिपेट : पेट्रोकेमिकल्स उन्नत अनुसंधान
स्कूल (एस ए आर पी) – ए आर एस टी पी एस
रसायन एवं पेट्रोरसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार
टी वी के इंडस्ट्रियल एस्टेट, गिण्डी, चेन्नै – 600 032
फोन : +91-44-22254794
ई-मेल : arstps@cipet.gov.in / arstpscipet@gmail.com
वेब्साइट : www.cipet.gov.in / www.arstps.gov.in
मुख्यालय : सिपेट, गिण्डी, चेन्नै – 600 032.

CIPET सि पे ट
probe · perform · practice · Plastics

CIPET : SCHOOL FOR ADVANCED RESEARCH IN PETROCHEMICALS (SARP) - ARSTPS
Department of Chemicals & Petrochemicals,
Ministry of Chemicals & Fertilizers, Govt. of India
T.V.K. Industrial Estate, Guindy, Chennai - 600 032.
Phone : +91-44-2225 4794
e-Mail : arstps@cipet.gov.in / arstpscipet@gmail.com
Website : www.cipet.gov.in / www.arstps.gov.in
Head office : CIPET, Guindy, Chennai - 600 032

TR No. PVT/155 **Date: 02.11.2021**

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 17088-2012/IS 17088: 2008 was found not more than 10% of original dry mass remain.

10 Seed Germination & Plant growth study

Plant Growth in Blank Compost (Control)

Plant Growth in Sample degraded Compost

Fenugreek - Dicotyledon

AUTHORIZED SIGNATORY
B. RAVI

AUTHORIZED SIGNATORY
Dr. K.P. BHUVANA

सिपेट : पेट्रोकेमिकल्स उन्नत अनुसंधान स्कूल (एस ए आर पी) – ए आर एस टी पी एस

रसायन एवं पेट्रोरसायन विभाग
रसायन एवं उर्वरक मंत्रालय, भारत सरकार
टी वी के इंडस्ट्रियल एस्टेट, गिण्डी, चेन्नै – 600 032
फोन : +91-44-22254794
ई-मेल : arstps@cipet.gov.in / arstpscipet@gmail.com
वेब्साइट : www.cipet.gov.in / www.arstps.gov.in
मुख्यालय : सिपेट, गिण्डी, चेन्नै – 600 032.

CIPET सि पे ट
probe · perform · practice · Plastics

CIPET : SCHOOL FOR ADVANCED RESEARCH IN PETROCHEMICALS (SARP) - ARSTPS

Department of Chemicals & Petrochemicals,
Ministry of Chemicals & Fertilizers, Govt. of India
T.V.K. Industrial Estate, Guindy, Chennai - 600 032.
Phone : +91-44-2225 4794
e-Mail : arstps@cipet.gov.in / arstpscipet@gmail.com
Website : www.cipet.gov.in / www.arstps.gov.in
Head office : CIPET, Guindy, Chennai - 600 032

TR No. PVT/155

Date: 02.11.2021

Plant Growth in Blank Compost (Control) **Plant Growth in Sample degraded Compost**

Onion - Monocotyledon

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

02/11/21

AUTHORIZED SIGNATORY
B. RAVI

2/11/2021

AUTHORIZED SIGNATORY
Dr. K.P. BHUVANA