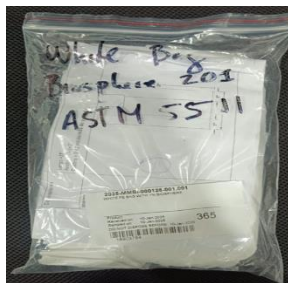
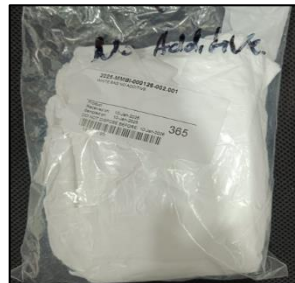


Report No.: MUM/000126/2025	Sample No: 18903794 - 95	Report Date: 27/06/2025
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Sample Registration Date	10/01/2025
Analysis Starting Date	10/01/2025
Analysis Completed on	In process
Sampling Done by	Sample drawn and supplied by customer
Deviation from the test methods:	None
Packaging Condition/sealed/unsealed	Sealed with box
Sample Image	 Figure 1: PE PLASTIC BAG 99% PE 1% Biosphere 201  Figure 2: WHITE BAG NO ADDITIVE

DETAILS PROVIDED BY THE CUSTOMER

Customer Name:	BYCSA S.A.
Contact Person:	Mr. Carolina Perez Quiros
Address:	CALLE 20 SUR # 25B 91 INT 130 0500001 MEDELLIN, COLOMBIA
Sample submitted as	1) PE PLASTIC BAG 99% PE 1% Biosphere 201(Aditivo Acelerador ECOBYC) (Group sample for BYCSA-BYCSA COSTUMERS-CAMARA AMBIENTAL DEL PLASTICO AFILIATES-BIOSPHERE) 2) WHITE BAG NO ADDITIVE
Description on label/Sample Bottle	PE PLASTIC BAG 99% PE 1% Biosphere 201 and WHITE BAG NO ADDITIVE
Sample type	PE PLASTIC BAG 99% PE 1% Biosphere 201 and WHITE BAG NO ADDITIVE
Quantity	1 Packet
Mode of Packaging	Courier Box
Sample condition	Sample was at ambient temperature in good condition
Test Method	ASTM D5511: Standard Test Method for Determining Anaerobic Biodegradation of Plastic Materials Under High-Solids Anaerobic-Digestion Conditions
Procedure number	NA

Note : The results reported relate to the sample tested only. Latest version of designated test methods has been used wherever it requires. The Test Certificate shall not be reproduced in full or part without the written permission of INTERTEK. The sample(s) has not been drawn/sampled by INTERTEK LAB. The reported result(s) provide no warranty or verification on the sample(s) representing any specific goods and / or shipment and only relate to the sample(s) as received and tested. This report was prepared solely for the use of the client named in this report. Intertek disclaims any and all liability for damage or injury which results in the use of the information contained herein and accepts no responsibility for any loss, damage or liability suffered by a third party as a result of any reliance upon or use of this report. All jobs are performed as per Intertek terms & Conditions available at <http://www.intertek.com/terms/or> can be made available on request

Report No.: MUM/000126/2025	Sample No: 18903794 - 95	Report Date: 27/06/2025
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LABORATORY

Testing as presented in this report was conducted by Environmental division of Intertek India Private Limited. The testing facility is located at F wing, 2nd Floor, Chandivali Saki vihar Road, Andheri (East), Mumbai – 400 072, India.

SAMPLE RECEIPT

The PE PLASTIC BAG 99% PE 1% Biosphere 201 (Aditivo Acelerador ECOBYC) (Group sample for BYCSA-BYCSA COSTUMERS- CAMARA AMBIENTAL DEL PLASTICO AFILIATES- BIOSPHERE) and WHITE BAG NO ADDITIVE samples were received on 10/01/2025 at the Intertek testing facility. The sample was sent through courier. The sample was at ambient temperature in good condition with no evidence of damage or contamination. No temperature preservation was required.

PROJECT DESCRIPTION:

PE PLASTIC BAG 99% PE 1% Biosphere 201 and WHITE BAG NO ADDITIVE samples were submitted by BYCSA S.A. for testing under standard ASTM D5511. This test method covers the determination of the degree and rate of anaerobic biodegradation of plastic materials in high-solids anaerobic conditions. The test materials are exposed to a methanogenic inoculum derived from anaerobic digesters operating only on pretreated household waste. The anaerobic decomposition takes place under high-solids (more than 30 % total solids) and static non-mixed conditions. This test method is designed to yield a percentage of conversion of carbon in the sample to carbon in the gaseous form under conditions found in high-solids anaerobic digesters, treating municipal solid waste.

INOCULUM COLLECTION AND CONDITIONING

The anaerobic digested sewage sludge (Figure 2) mixed with household waste was obtained from the Chembur (Mumbai). To make the sludge adapted and stabilized during a short post-fermentation at 53°C, the sludge was pre-incubated (one week) at 53°C. This means that the concentrated inoculum was not fed but allowed to post ferment the remains of previously added organics allowing large easily biodegradable particles were degraded during this period and reduce the background level of biogas from the inoculums itself.

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Report No.: MUM/000126/2025	Sample No: 18903794 - 95	Report Date: 27/06/2025
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Figure 3: Anaerobic microbial inoculum

INOCULUM PROPERTIES

A sample of the anaerobic digested sewage sludge was analyzed for pH, percent dry solids, and volatile solids, as well as, the amount of CO₂ and CH₄ evolution during the testing. Table 1 lists the results of this initial testing.

METHODOLOGY:

Inoculum Medium: Remove enough inoculum (approximately 15 kg) from the post-fermentation vessel and mix carefully and consistently by hand in order to obtain a homogeneous medium. Test three replicates each of a blank (inoculum only), Positive control (Reference material) (thin-layer chromatography cellulose), negative control (optional), and the test substance being evaluated.

Manually mix 1000 g wet weight (at least 20 % dry solids) of inoculum in a small container for a period of 2 to 3 min with 15 to 100 g of volatile solids of the test substance or the controls for each replicate. For the three blanks containing inoculum only, manually mix 1000 g of the same inoculum in a small container for a period of 2 to 3 min with the same intensity as was done for the other vessels containing test substance or controls. Determine the weight of the inoculum and test substance added to each individual Erlenmeyer flask accurately. Add the mixtures to a 2-L wide-mouth Erlenmeyer flask and gently spread and compact the material evenly in the flask to a uniform density.

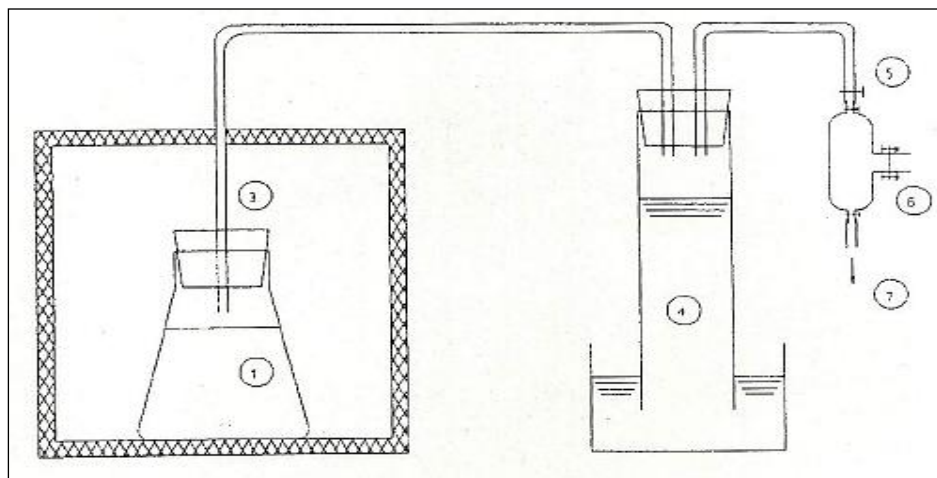
After placing the Erlenmeyer flask in incubator, connect it with the gas collection device. Incubate the Erlenmeyer flasks in the dark or in diffused light at 52°C (± 2°C) for thermophilic conditions, The incubation time shall be run until no net gas production is noted for at least five days from both the Positive control (Reference material) and test substance reactors. Control the pH of the water used to measure biogas production to less than two by adding HCl.

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Report No.: MUM/000126/2025	Sample No: 18903794 - 95	Report Date: 27/06/2025
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ANAEROBIC DIGESTER SETUP FOR THE PLASTIC BIODEGRADATION

The biodegradation testing of sample was performed in the digester as shown in the (Figure-3).



1. Digester
2. Incubator
3. Gas outlet
4. Gas collector
5. Valve
6. Gas Sampling
7. Gas Discharge

Figure-4: Digester setup

RESULT:

The most important biochemical characteristics of the inoculum such as pH, Volatile Fatty Acids, $\text{NH}_4^+\text{-N}$ — and dry solids were studied.

Table 1: Results of Initial testing of the anaerobic digested sewage sludge.

Parameters	Requirement	Actual results
pH	7.5 to 8.5	8.10
Kjeldahl nitrogen	0.5 to 2 g/kg wet weight	1.42
Dry Solids at 105 °C	>20%	44.00
Volatile Solids at 550 °C	Below 1 g/kg wet weight	0.76

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Report No.: MUM/000126/2025	Sample No: 18903794 - 95	Report Date: 27/06/2025
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The biogas volume in the gas sampling bag was measured (Table- 2). Presence of gas in the gas collector of Positive control (Reference material) indicated that the inoculum was viable and gas displacement was observed both in Positive control (Reference material) and Test Sample.

ASTM D 5511 states that for the test to be considered valid, the Positive control (Reference material) must achieve 70 % within 30 days with deviation less than 20% of the mean between the replicates.

The gas displacement observed after 90 days is as shown in the table below.

Table-2: Biogas volume of the evolved gas during the biodegradation process at 90 days

Biodegradation Test	Total Volume 90 days(mL)
Inoculum	2900
Positive control (Reference material)	10250
PE PLASTIC BAG 99% PE 1% Biosphere 201	6650
WHITE BAG NO ADDITIVE	3100

The percent biodegradation of Positive control (Reference material) and Test sample was calculated by the measured cumulative carbon dioxide and methane production from each flask after subtracting carbon dioxide evolution and methane evolution from the blank samples at the end of 90 days of testing. Calculations were based on Total Organic Carbon obtained of both Positive control (Reference material) and Test sample.

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Report No.: MUM/000126/2025	Sample No: 18903794 - 95	Report Date: 27/06/2025
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Table-3: Percentage biodegradability of Test sample with respect to Positive control (Reference material) Cellulose.

Group	Inoculum control	Positive control (Reference material)	PE PLASTIC BAG 99% PE 1% Biosphere 201	WHITE BAG NO ADDITIVE
Weight	1000 ml	10.2483 g	15.5825 g	15.4237 g
Total volume (ml)	2900.00	10250.00	6650.00	3100.00
% CH ₄	13.60	44.60	21.50	16.00
Volume of CH ₄ (ml)	394.40	4571.50	1429.75	496.00
weight of CH ₄ (g)	0.2587	2.9989	0.9379	0.3254
% CO ₂	14.50	44.90	23.40	14.40
Volume of CO ₂ (ml)	420.50	4602.25	1556.10	446.40
Weight of CO ₂ (g)	0.8326	9.1125	3.0811	0.8839
Total weight of carbon in grams	0.4188	4.7095	1.5353	0.4827
Theoretical weight of carbon in grams (Ci)	-	4.3115	12.1472	12.2717
Biodegradation	-	0.99518	0.09191	0.00520
% Biodegradation	-	99.52	9.19	0.52

Reviewed By

Authorized Signatory

Alok Pandey
Assistant Manager - Biodegradability Services

Ushadevi Yadav
Deputy Manager - Biodegradability Services

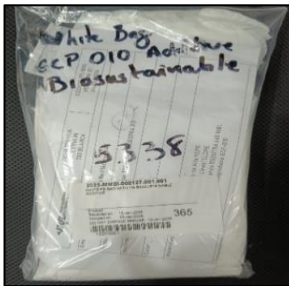
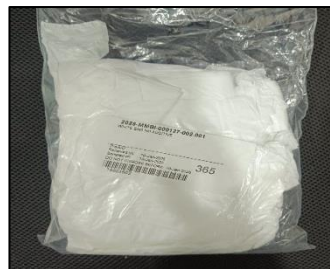
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TEST REPORT

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Off. Saki Vihar Road, Andheri (East)
Mumbai – 400 072, India.
Tel : +91 22 42450100
www.intertek.com

Report No.: MUM/000127/2025	Sample No: 18903861 - 62	Report Date: 27/06/2025
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Sample Registration Date	10/01/2025
Analysis Starting Date	10/01/2025
Analysis Completed on	In process
Sampling Done by	Sample drawn and supplied by customer
Deviation from the test methods:	None
Packaging Condition/sealed/unsealed	Sealed with box
Sample Image	 Figure 1: PE PLASTIC BAG 99% PE 1% Biosustainable/NEXU ECP-010  Figure 2: WHITE BAG NO ADDITIVE Sample

DETAILS PROVIDED BY THE CUSTOMER

Customer Name:	BYCSA S.A.
Contact Person:	Mr. Carolina Perez Quiros
Address:	CALLE 20 SUR # 25B 91 INT 130 0500001 MEDELLIN, COLOMBIA
Sample submitted as	1) PE PLASTIC BAG 99% PE 1% Biosustainable/NEXU ECP-010/ (Aditivo Acelerador ECOBYC ECP-010), Group sample for NEXU GROUP-BYCSA COSTUMERS-CAMARA AMBIENTAL DEL PLASTICO AFILIATES-BIOSUSTAINABLE 2) WHITE BAG NO ADDITIVE
Description on label/Sample Bottle	PE PLASTIC BAG 99% PE 1% Biosustainable/NEXU ECP-010 and WHITE BAG NO ADDITIVE
Sample type	PE PLASTIC BAG 99% PE 1% Biosustainable/NEXU ECP-010 and WHITE BAG NO ADDITIVE
Quantity	1 Packet
Mode of Packaging	Courier Box
Sample condition	Sample was at ambient temperature in good condition
Test Method	ASTM D5338: Determining Aerobic Biodegradation of Plastic Materials Under Controlled Composting Conditions, Incorporating Thermophilic Temperatures
Procedure number	NA

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Report No.: MUM/000127/2025	Sample No: 18903861 - 62	Report Date: 27/06/2025
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LABORATORY

Testing as presented in this report was conducted by Environmental division of Intertek India Private Limited. The testing facility is located at F wing, 2nd Floor, Chandivali Saki vihar Road, Andheri (East), Mumbai – 400 072, India.

SAMPLE RECEIPT

The PE PLASTIC BAG 99% PE 1% Biosustainable/NEXU ECP-010/ (Aditivo Acelerador ECOBYC ECP-010), Group sample for NEXU GROUP-BYCSA COSTUMERS-CAMARA AMBIENTAL DEL PLASTICO AFILIATES-BIOSUSTAINABLE and WHITE BAG NO ADDITIVE Samples Sample was received on 10/01/2025 at the Intertek testing facility. The sample was sent through courier. The sample was at ambient temperature in good condition with no evidence of damage or contamination. No temperature preservation was required.

PROJECT DESCRIPTION:

PE PLASTIC BAG 99% PE 1% Biosustainable/NEXU ECP-010 and WHITE BAG NO ADDITIVE samples were submitted by BYCSA S.A. for testing under standard ASTM D5338. This method determines the degree and rate of aerobic biodegradation of plastic materials on exposure to a controlled composting environment under laboratory conditions, at thermophilic temperatures. The samples were exposed to an inoculum that is derived from compost from municipal solid waste. The aerobic composting takes place in an environment where temperature, aeration and humidity are closely monitored and controlled. The percentage of biodegradability is obtained by determining the percentage of carbon in the test sample that is converted into CO₂ during the duration of the test.

Apparatus Setup:

A series of 09 composting vessels of 5-liter volume (1 blank i.e. compost, 1 positive i.e. cellulose mixed with compost, and 1 test plastic sample mixed with compost, all in 3 replicates). The entire composting vessel were kept in Incubator capable of maintaining the temperature of composting vessels at $58 \pm 2^{\circ}\text{C}$ (Figure 2). Pressurized air system that provides CO₂ free, H₂O saturated air to each of the composting vessels at accurate aeration rate. CO₂ evolved will be absorbed by 0.024 N Ba (OH)₂ and the amount of CO₂ will be determined by titrating with 0.05 N HCl.

Compost Inoculum:

The compost inoculum should be 2 to 4 months old, well aerated compost from organic fraction of municipal solid waste, sieved on a screen of less than 10 mm, compost from plants, treating green or yard waste or mixtures of municipal solid waste and green waste should be used. The compost inoculum should produce 50-150 mg of CO₂ per gram of volatile solids over the first 10 days of the test and an ash content of less than 70% and a pH between 7 and 8.2, is desired. The amount of total dry solids may range from 50 to 55%. Compost should have sufficient porosity to enable aerobic conditions. The compost inoculum should be as free from larger inert materials (glass, stones, metals, etc.) as possible.

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Report No.: MUM/000127/2025	Sample No: 18903861 - 62	Report Date: 27/06/2025
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Figure 2: compost inoculum

PROCEDURE:

The composting vessels will be incubated in diffuse light minimum for a period of 45 days, or more & the temperature of the system will be maintained at 58°C. The CO₂ & O₂ concentrations will be checked in the outgoing air. The air flow will be adjusted to maintain a CO₂ concentration of at least 2% vol /vol to allow accurate determination of CO₂ level in the exhaust air. Composting vessels will be shaken weekly to prevent extensive channeling, provide uniform attack on test specimen and provide an even distribution of moisture.

Carbon Dioxide Analysis:

The carbon dioxide (CO₂) produced in each vessel reacted with Ba(OH)₂ and will be precipitated as barium carbonate (BaCO₃). The amount of carbon dioxide produced will be determined by titrating the remaining barium hydroxide with 0.05N hydrochloric acid to a phenolphthalein end point. Data obtained from the titration will be used to calculate the amount of CO₂ produced.

RESULTS:

The PE PLASTIC BAG 99% PE 1% Biosustainable/NEXU ECP-010 and WHITE BAG NO ADDITIVE Samples were subjected to biodegradation as per ASTM D5388 biodegradability test under controlled composting conditions at 58°C ± 2°C and biodegradability was determined by measuring the actual metabolic conversion of the compostable material into carbon dioxide using the standard test method. After 90 days of incubation under dry (58 °C ± 2°C), aerobic controlled composting conditions using test method ASTM D5338, the reference (Positive control) and sample were gradually biodegraded. The reference sample degraded around 98.67 % after 90 days and The PE PLASTIC BAG 99% PE 1% Biosustainable/NEXU ECP-010 and WHITE BAG NO ADDITIVE Sample showed 12.69 % and 0.75 % respectively after 90 days.

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Report No.: MUM/000127/2025	Sample No: 18903861 - 62	Report Date: 27/06/2025
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Table 1: Percentage Biodegradation of Positive control and Test samples

Day	Percentage Biodegradation		
	Positive Control	PE PLASTIC BAG 99% PE 1% Biosustainable/NEXU ECP-010	WHITE BAG NO ADDITIVE
0	0.00	0.00	0.00
3	5.24	0.67	0.00
6	9.25	1.21	0.08
10	18.25	2.67	0.13
14	23.45	3.88	0.18
18	29.83	4.11	0.22
21	36.50	4.89	0.28
24	42.67	5.29	0.29
27	52.80	5.89	0.32
30	60.53	6.27	0.38
35	68.92	6.82	0.42
40	71.53	7.12	0.49
45	76.88	7.40	0.55
52	80.82	8.20	0.60
60	84.82	8.62	0.64
67	87.46	9.29	0.66
72	90.62	10.27	0.69
80	94.45	11.46	0.71
90	98.67	12.69	0.75

Reviewed By

Authorized Signatory

Alok Pandey
Assistant Manager - Biodegradability Services

Ushadevi Yadav
Deputy Manager - Biodegradability Services

End of Report

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