Total Quality. Assured.

Number: HKGT05489202

TEST REPORT

Applicant:

Date: Jul 11, 2024

Attn:

Sample Description As Declared :

No. Of Sample	:	Several
Sample Description	:	PVC Rain Boot
Sample Weight	:	1.2kg
Fiber Content	:	PVC
Ref.	:	Colour: Black Style No: HVPVCRNM Brand: Unbranded Season: Spring PO No: 08954921 SKU No: 089-9534-6 Country Of Origin: China End Use: Men/ Women/ Children/ Infant's Consumer Casual Footwear Rainboot

Date Received/Date Test Started : Jul 10, 2024

For and on behalf of
Intertek Testing Services Hong Kong Limited

Amy K.W. Wong
Assistant General Manager

Intertek Testing Services Hong Kong Limited
2/F Garment Centre
576 Castle Peak Road
Kowloon, Hong Kong
Tel +852 2173 8888
Fax +852 2786 1903
intertek.com.hk

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Original Sample Photo:

Figure 1: Test Sample

For any sustainability support or queries on this report, you are welcome to contact our Assistant Director:
Brenda Wong - Mobile phone and Whatsapp at (852) 9726 1720 or via email brenda.ps.wong@intertek.com

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Tests Conducted (As Requested By The Applicant)

1 Microplastics in soil - Environmental biodegradation sources (ISO 24187 + ISO 8844 part 2):

Project Description: The test sample PVC RAIN BOOT (Laboratory ref. no. 17924247) was subjected to anaerobic biodegradation testing as per ASTM D5511 for 45 days and examination of inoculum obtained from this biodegradation studies was performed to ascertain the evidence of potential remains of original samples or any microplastics formation as per ISO 4484-2:2023(en) modified. The remains were transferred into petri dishes and screened for evidence of material consistent with microplastics by Light Microscopy (Thermo and Zeiss LM).

Sample extraction and methodology:

- The inoculum obtained after biodegradation was filtered on cellulose nitrate membrane (0.2 micron) filter paper.
- This filter paper was air dried and further used for primary and secondary screening.
- Primary screening for potential microplastics or potential remains of original samples was performed on both the biomass extract (liquid) and filter paper using optical/light Microscopy (LM).
- The material was repeatably agitated to ensure a thorough examination.
- The primary screening was run in triplicates and particles that were suspected of being consistent with microplastics were isolated and collected for further evaluation.
- These particles were evaluated for the presence of any microplastics formation using Thermo Scientific Nicolet iN5 MX FTIR Imaging and Thermo Axia ChemiSEM with EDX.
- The IR spectra of the original sample was run for remnant analysis.

Observation :

Primary Screening

Few potential particles were isolated during primary screening under microscopy techniques.
- Few particles were observed in primary screening which could be remnant particle of original sample.
- Thin flat translucent, soft but brittle, particle which appears to be polymeric was also detected.

All these particles were subjected for secondary screening, to evaluate if these particles were microplastics, or microfibers which were not biodegradable.

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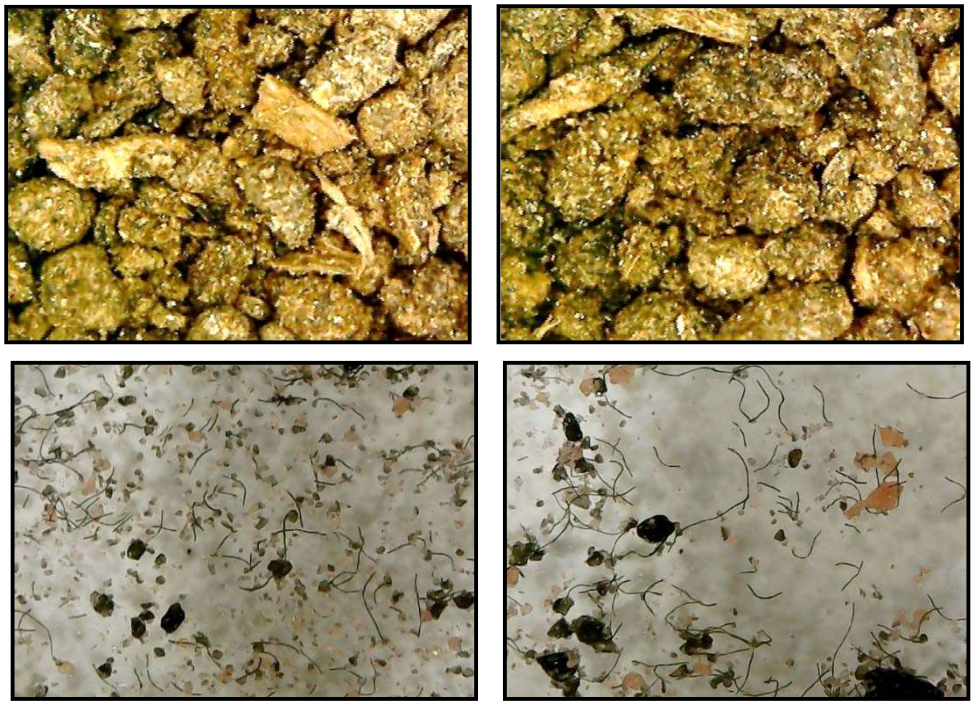
Secondary screening

Microscopy analysis Light microscopy and SEM EDX analysis

The images below are of microscopic screening of the entire inoculum to check for presence of any potential microplastics.



Light microscopy images of inoculum and filter paper

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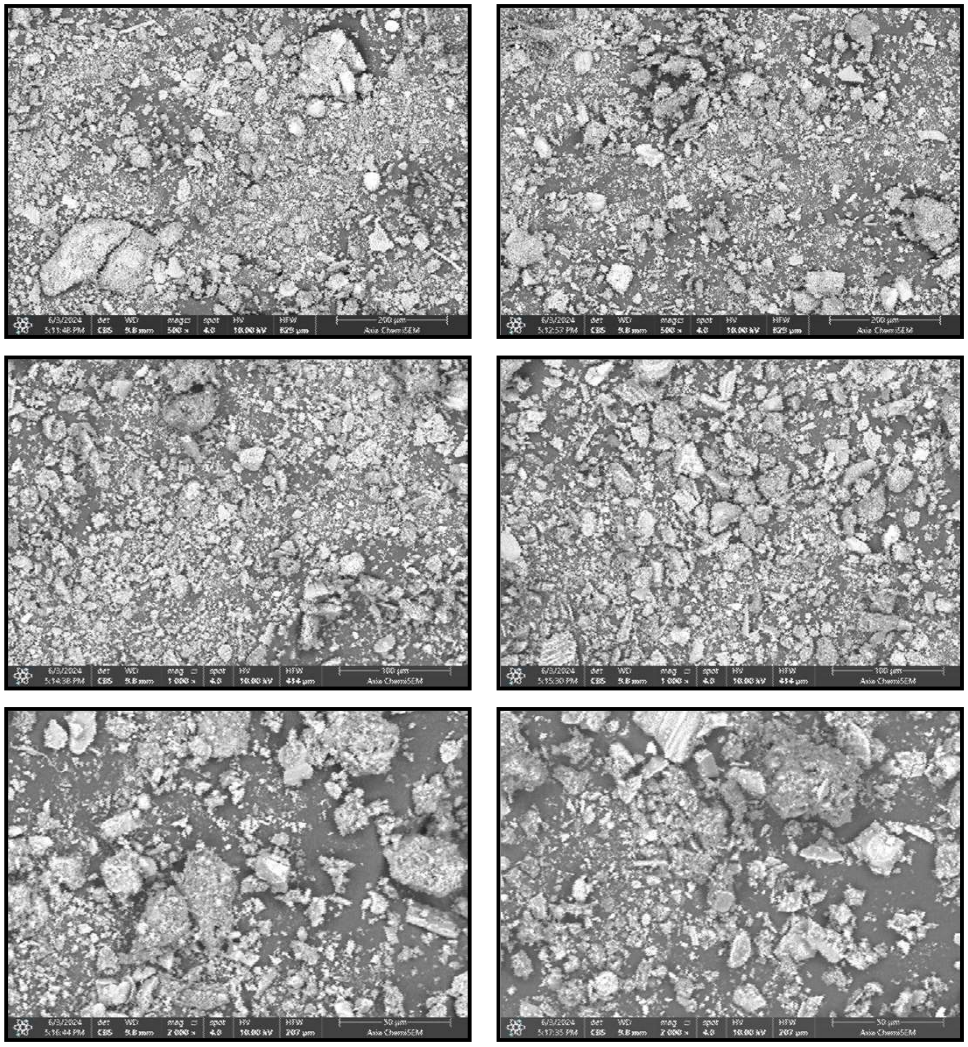
Microscopy analysis Light microscopy and SEM analysis



SEM microscopy images of inoculum

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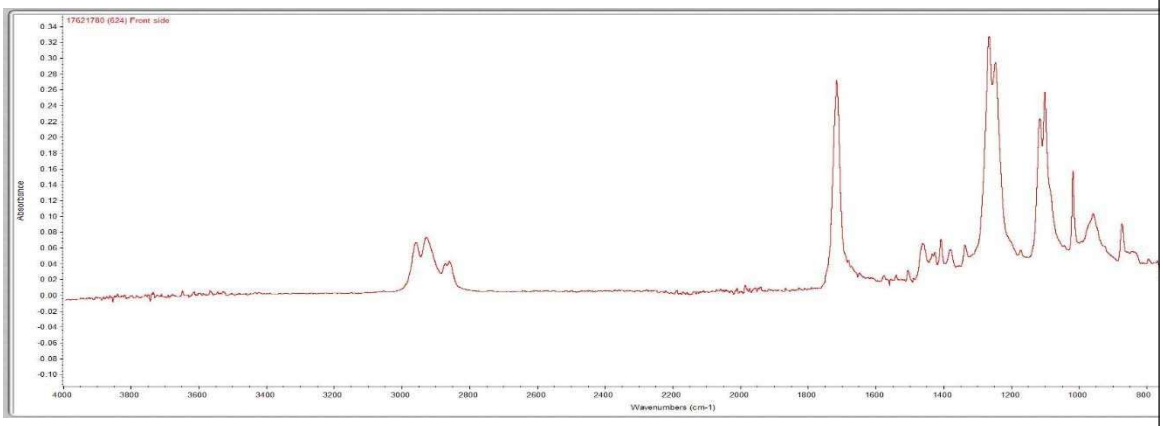
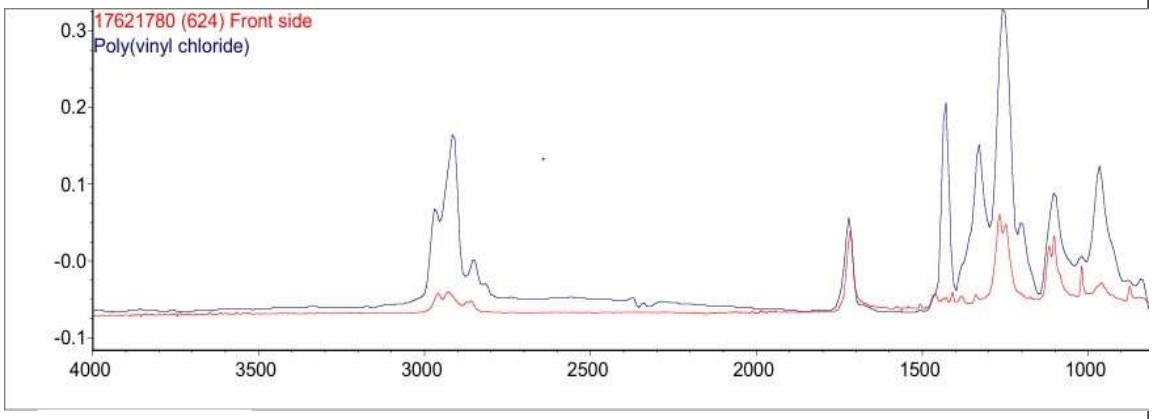
Observations:

FTIR ATR analysis

The FTIR analysis of the initial sample PVC Rain Boot sample was run to check the presence of remnant or any plastic material in the product after biodegradation studies.
Graph 1 represents the IR spectra of original sample while Graph 2 represents the IR spectra of matching with PVC polymer material.



Graph 1: IR Spectra of Original PVC Rain Boot Sample (17924247)



Graph 2: IR Spectra of Original PVC Rain Boot Sample match with PVC (17924247)

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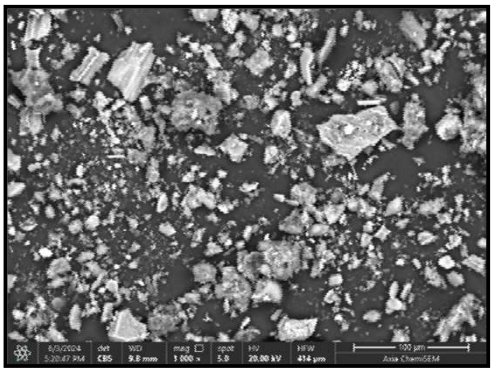
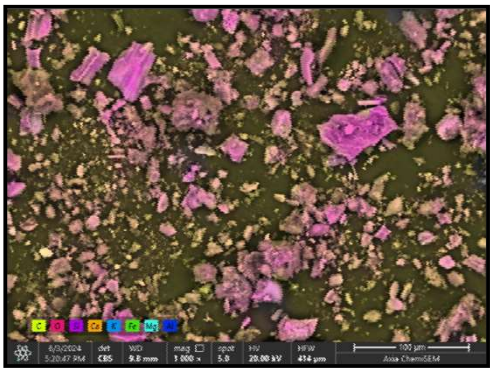
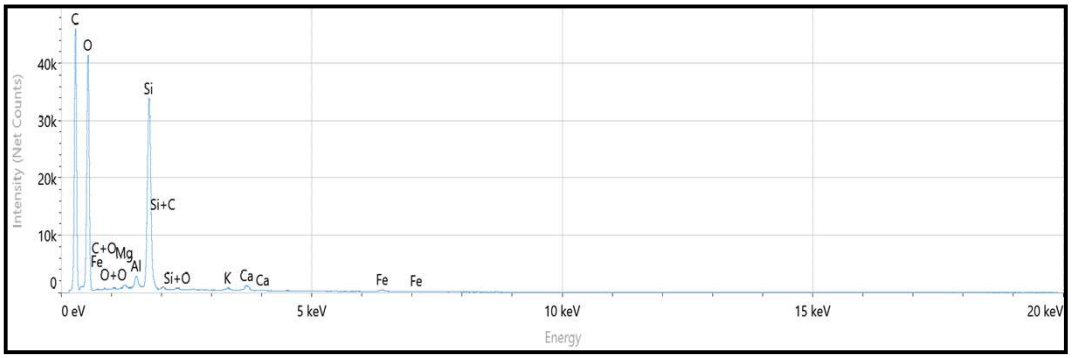
Observations:

SEM-EDX analysis

The potential particles picked in primary screening were further screened under SEM EDX microscopy for confirmation.







The elemental mapping was performed using EDX analysis which shows the presence of Carbon, Oxygen, silica, traces of Aluminum, potassium, iron, calcium and magnesium.

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Summary and Interpretation

- The peaks observed in the FTIR ATR analysis of the original sample confirms the material as poly (vinyl chloride).
- The potential particles observed in primary screening of the inoculum after 45 days biodegradation studies did not show any traces of the original sample indicating that the biodegraded part of the original sample did not leave any of its remnant in the inoculum.
- Few particles of other source such as minerals materials (cellulose, proteins, and beta carotene) was observed.
- The potential particles observed did not show any resemblance to polypropylene (PP), polyethylene (PE), polyethylene terephthalate (PET), polystyrene (PS) or any Unspecific long chain aliphatic hydrocarbon containing materials.

Conclusion:

- The test sample PVC RAIN BOOT (Laboratory ref. no. 17924247) sample received from Intertek Hong Kong- Softlines was subjected to biodegradation testing for 45 days after which the inoculum residue was further subjected to primary and secondary screening to evaluate the presence of any microplastics formation and remnant analysis. Microplastics or any remnant of the original samples was not observed in the inoculum sample submitted for testing. The biodegraded part of the original sample did not leave trace of its remnant in the inoculum after 45 days of biodegradation study.

Remark : The test was performed by an approved subcontractor laboratory which is part of the Intertek Group.

End of Report

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