RecyClass

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The RecyClass PO Films Technical Committee investigated the effect of acrylic-based laminating adhesives on the recyclability of PE films. Following this test, the RecyClass PO Films Technical Committee managed to deliver new recommendations on the compatibility of water-based acrylic laminating adhesives in PE and PP flexible packaging recycling.

The Laminating Adhesive Working Group coordinated this test campaign. The sample composition was carefully defined to ensure comparability with previous results obtained using polyurethane (PU) laminating adhesives[1]. Therefore, the LDPE laminate used in the test contained 2.5 wt% of acrylic laminating adhesive. The films were produced using Dow 310E grade, consistent with the previous test campaign on PU laminating adhesive.[2]

Five different water-based acrylic laminating adhesive samples were tested during the test campaign, the samples were provided by BASF, Dow, and HB Fuller. The samples were tested at Proplast, a recognized testing facility, according to the RecyClass Recyclability Evaluation Protocol for Laminating Adhesives Applied on PE Films.

The laboratory results showed no issues during the pretreatment steps, and the extrusion process was stable without any filter build-ups. The extruded pellets containing the acrylic laminating adhesive did not exhibit thermal degradation or black specks, although a slight shift towards a pale-yellow colour in some of the sample containing acrylic laminating adhesive was observed. This change was sometimes not easily visible but was detected through colour instrument measurements (see Annex 1).

The extruded pellets were mixed with virgin and were then converted into film. No breakages occurred during the blowing step, and the process was consistent, producing films with a smooth texture and no increase in gel or specks compared to the control material.

In summary, based on the findings from the Recyclability Evaluation Protocol, the RecyClass PO Films Technical Committee has emitted the following recommendations for the different PE and PP recycling streams:

[1] Technical Review – Laminating Adhesives test campaign (2023)

[2] Technical Review – Laminating Adhesives test campaign (2023)

- **For the PE Film Coloured Streams:** Water-based acrylic laminating adhesives are fully compatible when representing less than 3 wt% of the total film weight, confirming the previous recommendation.
- **PE Natural Film Stream:** The recommendation has been updated to indicate water-based acrylic laminating adhesives have limited compatibility with the PE natural recycling stream when representing less than 2.5 wt% of the total film weight.

Additionally, the PO Films Technical Committee has extended these recommendations to the Design for Recycling Guidelines for PP flexibles. This decision is based on the observation that the recycling processes for both PE and PP streams do not differ in processing temperature and conditions, and no different outcomes were expected from the testing.

- **For the PP Film Coloured Streams**: Water-based acrylic laminating adhesives are fully compatible when representing less than 2.5 wt% of the total film weight.
- **PP Film Natural Streams**: Water-based acrylic laminating adhesives are considered as limited compatible when representing less than 2.5 wt% of the total film weight.

About RecyClass

RecyClass is a non-profit, cross-industry initiative advancing recyclability, bringing transparency to the origin of plastic waste and establishing a harmonized approach toward recycled plastic calculation & traceability in Europe. RecyClass develops Recyclability Evaluation Protocols and scientific testing methods for innovative plastic packaging materials which serve as the base for the Design for Recycling Guidelines and the RecyClass Online Tool. RecyClass established Recyclability Certifications for plastic packaging, Recycling Process Certification and Recycled Plastics Traceability Certification for plastic products.

RecyClass – Plastic Future is Circular

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Annex I

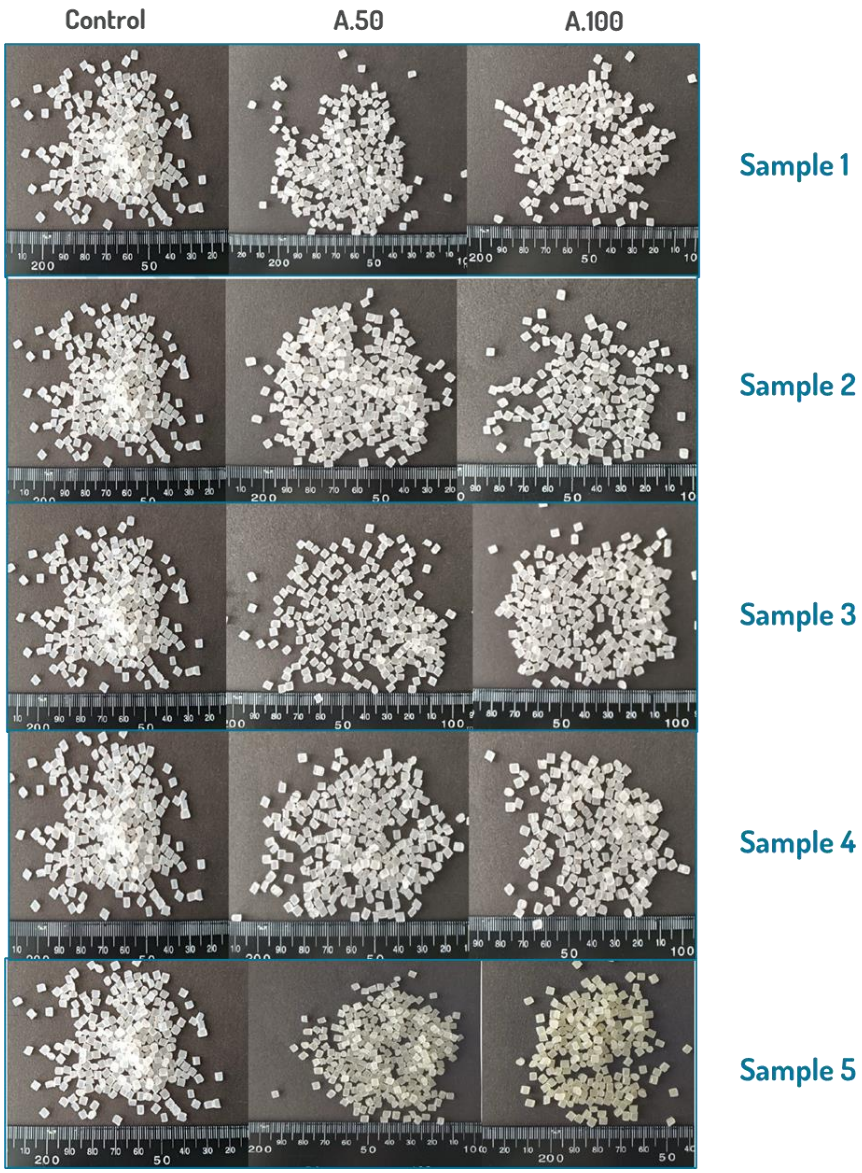

Figure 1: Pictures of the five Innovation pellets in comparison with the control