

# General Notice

## Influence of EVOH on recycling of PP packaging

### CONTEXT

Ethylene vinyl alcohol copolymer, or EVOH, is a polymer commonly used in packaging manufacture. Its superior gas, aroma and flavour barrier properties protect and conserve products. To have the full benefit of these barriers, EVOH must be combined with another humidity-resistant material, and is therefore generally combined with polyolefins (PE and PP) in multi-layered packaging.

COTREP has studied the recycling properties of EVOH in specific packaging (Technical Notices 04-03 and 09-03). These study findings showed no impact on the HDPE/PP bottle recycling stream, since this packaging contains a low proportion of EVOH at < 3%.

As the sorting guidelines in France are being extended to all household plastic packaging, new types of packaging in addition to bottles (namely pots, trays, film and flexible packaging) are being added to the plastic recycling streams, which will potentially increase the proportion of EVOH in these streams.

In light of the potential increased EVOH content in recycling feedstock and the fact that it has thus far only been included in partial studies, COTREP wished to examine the influence of EVOH on recycling of HDPE and PP<sup>1</sup>.

### STUDY RESULTS

In MRFs, packaging containing EVOH is primarily channelled into the recycling stream for the main resin in the packaging, in this case, the combined HDPE/PP stream.

The behaviour of EVOH was studied during recyclability tests in the lab, based on a protocol that is representative of the procedures used in the PP household packaging recycling industry in Europe.

During this test, EVOH was added in varying proportions to a batch of recycled PP (the "standard" material) representative of the PP recycling stream. EVOH was introduced in the following proportions: 1% (batch one) and 5% (batch 2), which are higher than the estimated proportions of EVOH in this type of packaging in the French market<sup>2</sup>.

The analysis of the physico-chemical and mechanical characteristics of EVOH was conducted on injection moulded samples obtained from batches 1 and 2. These properties were then compared with the samples produced from a batch of 100% recycled PP to confirm the resin's potential for use in the market outlets available for PP packaging recyclers.

<sup>1</sup> General Notice 52: Influence of EVOH on HDPE streams.

<sup>2</sup> With respect to the maximum quantity of EVOH in a packaging and the proportion of PP packaging containing EVOH in the stream, the estimated EVOH concentration in the PP stream is currently less than 1%.

With regard to the injection moulded products, the results show a slight reduction in the mechanical properties between the standard material and recycled PP with 1% EVOH. Nonetheless, this did not generate any significant impact on the use of the recycled material. On the other hand, from a level of 5% EVOH, the mechanical properties deteriorate significantly, especially the impact resistance of the material. As a result, at this EVOH concentration, the material is incompatible with this type of application.

## CONCLUSION

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The test results described above show that EVOH has no impact on the recycling process at a concentration of 1% in the PP household packaging stream. However, from 5% EVOH, recycling of PP packaging is disrupted.

**In conclusion, with the equipment and techniques currently available and used in Europe and given the estimated proportion of EVOH in HDPE/PP streams (less than 1%), EVOH does not disrupt recycling of PP packaging.** However, if the quantity of EVOH on the market were to increase substantially, COTREP reserves the right to revise its opinion.


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