General Notice

PET and HDPE packaging made from bio-based polymers

1/ BIO-BASES AND BIOPLASTICS – DEFINITIONS, CLASSIFICATION AND APPLICATIONS

The stock of recyclable material now contains a significant proportion of biopolymers, which have a number of different congeners: with a variety of structures, a range of different sources and numerous properties on offer, it has proved necessary to classify them, so that a distinction to be made between, amongst other things:

- Bio-sourced plastics: polymers partly or wholly composed of renewable carbon substrates;
- Bioplastics: bio-sourced polymers that are compostable in accordance with standard NF EN 13432.

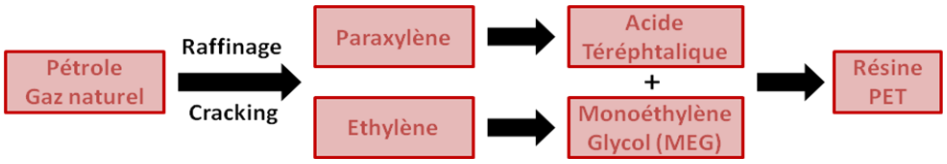
The packaging sector is the biggest market for plastics produced from renewable sources, with applications that primarily use PLA, bioplastics made from starch and those made from cellulose, which were the first to be developed. These polymers, however, are not covered by this notice.
Since 2009 bio-sourced plastics have been gaining market share in the packaging industry.

Consequently, given the increasing proportions of bio-PET and bio-PE in bottles, their impact on the existing recycling chain should be clearly defined.

2/ BIO-SOURCED PET AND HDPE – SYNTHESIS AND CHEMICAL COMPOSITION

PET is synthesised from two substrates, terephthalic acid (PTA)and monoethylene glycol (MEG), in proportions of 70% and 30% respectively. The synthesis diagrams for the two types of PET – bio-sourced and petrochemical – are identical, given that these two components are the starting point for each. In industrial synthesis processes to date, only MEG has a different source, with the substrates derived either from petrochemical conversion processes or obtained by converting sugar cane (*Figure 1*). The biopolymer content of bio-PET is, therefore, as yet only 30%.

Conventional PET synthesis
(from fossil resources)



Bio-PET synthesis
From renewable sources)

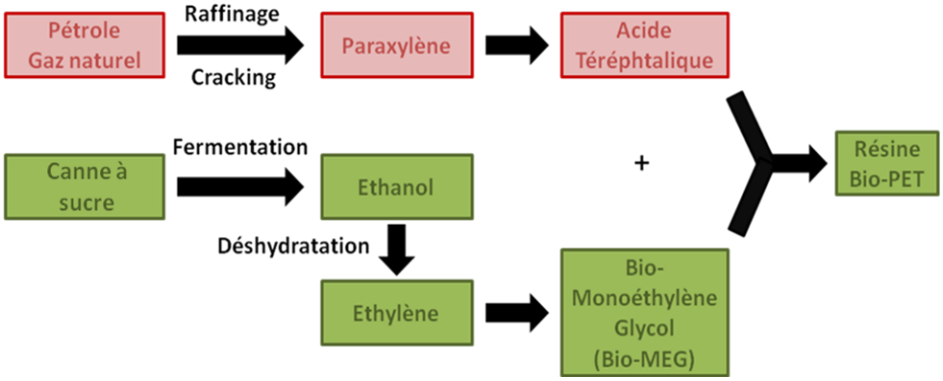
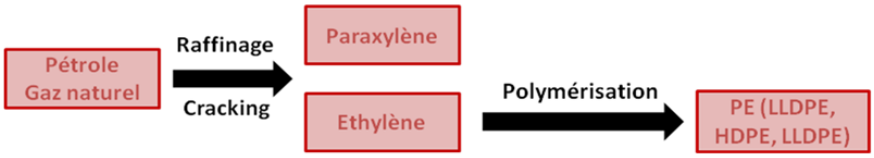


Figure 1. Synthesis diagrams for "conventional" PET and bio-PET

Bio-HDPE (*High Density PE*) is produced from ethylene (*Figure 2*), which is obtained using the same procedure as presented above for bio-PET.

Conventional PE synthesis *(Ethylene from fossil resources)*



Bio-PE synthesis *(Ethylene from renewable resources)*

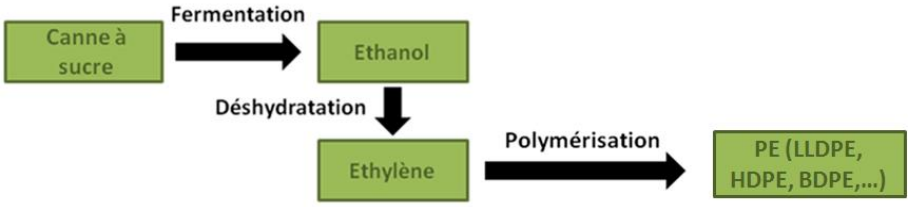


Figure 2. PE synthesis by polymerisation

The chemical composition of bio-sourced PET and PE is therefore identical to that of corresponding polymers derived from petrochemical sources.

CONCLUSION

Due to the **strict structural analogy** between **bio-sourced and petrochemical based polymers**, the physico-chemical properties of bio-HDPE and bio-PET remain unchanged. There is therefore **no impact on recycling, irrespective of the application.**