

PLA BOTTLE



Introduction

PLA is a biobased and industrially compostable plastic used in low volume for manufacturing packaging such as bottles, films and trays. PLA plastic packaging is usually shown with the resin identification code #7 followed by "PLA."

As is the case for other types of plastics generated in very low quantities, there is currently no stream for recovering and recycling any PLA bottles put on Quebec's market, even if, technically, such a stream could be set up. As PLA bottles are typically transparent and similar in appearance to PET bottles, they may be wrongly sorted and therefore impact the recovery and recycling of PET bottles. The following summary table shows the potential impacts PLA bottles have on PET bottles recycling stream.

Summary Table

	STEPS	LEVEL OF IMPACT	IDENTIFIED IMPACTS	IDENTIFIED CONSEQUENCES
CURBSIDE RECYCLING COLLECTION	Collection and transportation	○	None	None
	Sorting centre operations	○	None	None
	Sorting			
	- manual	●	<ul style="list-style-type: none"> Increase in the percentage of bottles misidentified by sorters and directed to the wrong stream 	<ul style="list-style-type: none"> Contamination of some recyclable materials, particularly PET bottles
	- mechanical	○	None	None
	- optical	○	None	None
	Grinding and washing	○	None	None
CONDITIONING AND RECYCLING	Additional sorting	◐	<ul style="list-style-type: none"> Sink/float tank separation and manual sorting ineffective in separating PLA from PET 	<ul style="list-style-type: none"> Need for optical sorting equipment
	Processing	●	<ul style="list-style-type: none"> PLA agglomeration during drying and PET processing Yellowing and opacification of recycled PET due to the presence of PLA 	<ul style="list-style-type: none"> Problems in operation of equipment Lower quality resin produced from recycled PET bottles

LEGEND: ○ No impact ◐ Caution (uncertainty or complication) ● Problem

Recommendation

ÉEQ's research, available external studies, expert opinions and external opinions all indicate that PLA bottles are not recycled in Quebec. Quantities of PLA bottles currently placed in recycling bins are very low, but a greater number to be put on the market could generate impacts on PET bottle curbside recycling collection and recycling system. Potential impacts identified in the summary table provide the basis for the following recommendation:

ÉEQ recommends avoiding the use of PLA bottles given the current state of Quebec's curbside recycling collection and recycling system.

Additional Information

PLA bottle

FACT SHEET DIRECTORY

ÉEQ's directory of fact sheets is growing. New fact sheets are being developed for other types of plastic bottles. In addition to PLA and PET, other types of plastic, including polypropylene (PP) and high-density polyethylene (HDPE), may be used to manufacture bottles.

PLA IDENTIFICATION

PLA, known as polylactide polymer or polylactic acid, is currently identified as a #7 plastic, which is the designation code for "Other Plastics" in the classification originally developed by The Society of the Plastics Industry (SPI). Ownership of the resin identification code was transferred to the ASTM in 2008, and ASTM working group D20-95 is currently considering the relevance of specific new codes for resins such as PLA.

PLA RECYCLING

Technically, PLA is a postconsumer material that may be recycled using a feedstock recycling process [External studies]. Initiatives to recycle

postconsumer PLA are under development in the United States. A recovery and recycling stream for this material is not, however, in place in Quebec, as sorting centres do not currently sort and resell it to recyclers. Should such a stream be implemented in Quebec, ÉEQ will update this fact sheet accordingly.

CONDITIONS FOR PLA BOTTLES MARKET USE

A major PLA resin producer has implemented strict sales conditions for PLA resin used specifically for bottle manufacturing. According to those conditions, the producer will sell PLA resin to bottles producers only if a responsible management plan is in place for handling the end-of-life of these bottles.

OTHER RECOVERY STREAMS

ÉEQ fact sheets do not consider recovery streams other than recycling, for which coverage rates are still marginal in Quebec.

Additional information to the summary table

MANUAL SORTING

Some PLA bottles are difficult to distinguish from PET bottles as they are similar in appearance, particularly due to their transparency. In sorting centres that separate bottles exclusively by manual sorting, there is a risk that these bottles may be sorted and baled along with PET bottles [Expert opinions]. It should be noted that manual sorting using alternative techniques such as black fluorescent light can enable the identification of PLA bottles (NatureWorks Internet site); however, none of the sorting centres consulted for developing this fact sheet has tested this method. The situation is different in sorting centres with optical sorting equipment to separate bottles, as this type of equipment can distinguish PLA from other plastics (WRAP, 2008; NatureWorks LLC, 2009) [External studies].

ADDITIONAL SORTING

Sink/float tank separation is a sorting technique used by recyclers to separate materials with a lower density than water (and therefore float) from those that have a higher density than water. As both PLA and PET

are denser than water, they cannot be sorted by sink/float tank separation [External studies]. Additional equipment such as optical sorting is necessary, entailing extra costs. In the case of HDPE and PP bottles, sink/float tank separation is an effective sorting technique as these materials float on water (their density is lower than water).

PROCESSING

PLA requires a much lower transition temperature than does PET, therefore affecting drying and processing steps. At PET drying temperature, PLA flakes melt and clump. Tests conducted by the Comité Technique pour le Recyclage des Emballages Plastiques (COTREP) (2007) show that 2% and 5% PLA concentrations result in agglomeration and sticking to dryer walls [External studies]. Other COTREP tests to simulate Bottle-to-Bottle recycling show that the presence of 0.1% PLA results in significant opacification of recycled PET and that, in concentrations higher than 0.3%, PLA causes yellowing of PET [External studies].

Main References

- Comité Technique de Recyclage des Emballages Plastiques (2007). *General Notice - Technical Sheet - PLA Packaging*, COTREP, reference dated July 16, 2011, <http://www.cotrep.fr/fileadmin/contribution/mediatheque/avis-generaux/francais/corps-de-l-emballage-et-additifs/FT35-impacts-de-bouteilles-en-pla.pdf>
- NatureWorks LLC (2009). *Using Near-Infrared Sorting to Recycle PLA Bottles*, reference dated July 14, 2011, http://www.natureworkslc.com/the-ingeo-journey/end-of-life-options/recycling/~media/The_Ingeo_Journey/EndofLife_Options/mech_recycling/20090708_NatureWorks_UsingNIRSortingtoRecyclePLABottles.pdf.pdf
- NatureWorks LLC, *Recycling (recovery & sortation)*, reference dated November 28, 2011, <http://www.natureworkslc.com/The-Ingeo-Journey/End-of-Life-Options/Recycling.aspx>
- PTI-Europe SARL (2006). *Protocole to Evaluate the Influence of PLA Bottles on the Clear RPET Stream*, Petcore.
- Recoup (2009). *Plastics Packaging - Recyclability by Design*, 2009 revised edition, reference dated September 24, 2010 http://www.recoup.org/design/docs/202July_09_APR_endorsement_RBD.pdf
- WRAP (2008). *Domestic Mixed Plastics Packaging Waste Management Options - An assessment of the technical, environmental and economic viability of recycling domestic mixed plastics packaging waste in the UK*, reference dated August 24, 2010, <http://www.wrap.org.uk/sites/files/wrap/Mixed%20Plastic%20Final%20Report.pdf>