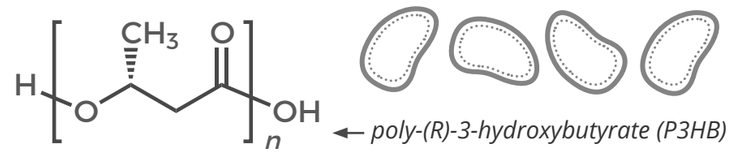
THE CHEMISTRY OF BIODEGRADABLE PLASTICS

COMMON BIOPOLYMERS & SOURCES

POLYLACTIC ACID (PLA)

Obtained from fermented plant starch from corn, cassava, sugar cane or sugar beet.

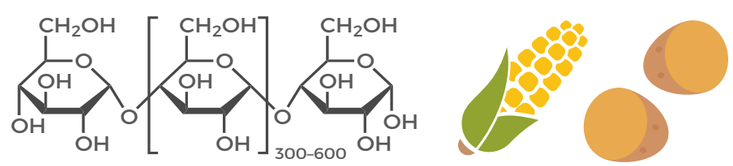
POLYHYDROXYALKANOATES (PHAs)



← *poly-(R)-3-hydroxybutyrate (P3HB)*

Extracted from bacteria, which produce it via the fermentation of sugar or lipids.

THERMOPLASTIC STARCHES (TPS)

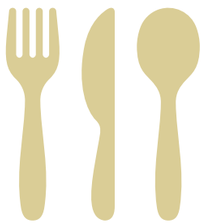


Starches from plant materials are heated with water, then mixed with plasticisers or other polymers.

EVERYDAY USES OF BIOPOLYMERS

Biodegradable coffee cups are paper cups with a PLA lining to make the paper waterproof.

PLA has the second largest production volume of any biopolymer (behind TPS). It is also used in plastic films, bottles, and food containers.

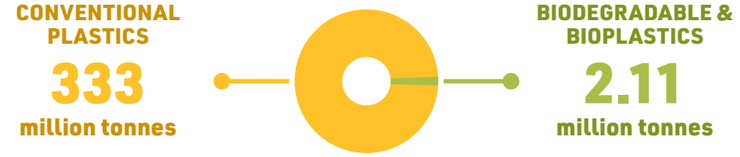


PLA and TPS both find use in the manufacture of plastic cutlery that's biodegradable.

TPS is also used in food waste bags and some magazine wrappers. PHAs have fewer uses, but have medical uses such as in surgical sutures.

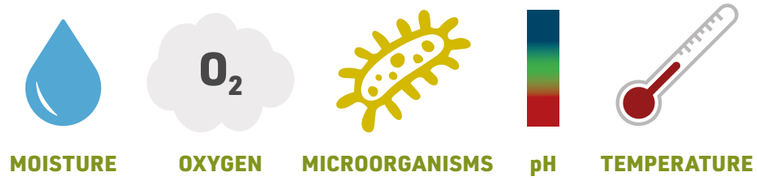
ADVANTAGES AND DISADVANTAGES

GLOBAL PLASTIC PRODUCTION



Use of bioplastics is increasing, but they still account for less than 1% of the global plastics market (as of 2018).

CONDITIONS FOR BIODEGRADING



Compostable plastics need specific conditions to break down – and take much longer to do so completely if they go to landfill instead of being recycled. However, they still break down faster than conventional plastics.

Biodegradable plastics are more expensive than plastics derived from fossil fuels on weight basis, and require land to grow raw materials. However, the greenhouse gas emissions associated with their production are lower.