

DeToxoLys - Detoxification and recycling of contaminated plastic waste streams with hydrothermal liquefaction (HTL)/solvolysis

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One of the major challenges for plastic recycling is that waste streams are often mixed with additives and contaminants that are difficult to separate from the polymer. Many of these contaminants are restricted by the European Union as SVHC (Substances of Very High Concern), that must be separated from the plastic waste before the recycled material can be used.

This leads to that plastics suitable for mechanical recycling such as polyolefins and polystyrene will be incinerated. There is therefore a need for methods that remove impurities from the plastic, either by isolation or degradation of the impurities.

The present study aims at developing a solvolysis-based recycling method for the removal of brominated flame retardants, chlorinated phosphates and phthalate plasticizers from potentially recyclable polymers. These groups represent common plastic additives that hinders recycling and cover functional groups suitable for hydrolytic degradation at conditions that leave the recyclable polymer intact. The solvolysis is performed in water at temperatures up to 350 °C aiming at additive degradation and removal.

The experimental results from solvolysis at various temperatures (250-350 °C) and time intervals (1-4h) phthalate (DEHP), organic phosphates (TCEP, TPP and TCP) and brominated flame retardants TBBPA degradation pathways will be presented and put in context related to waste streams (electronic waste WEEE, end-of-Life Vehicles (ELV) and construction and demolition waste fractions) and environmental benefit.

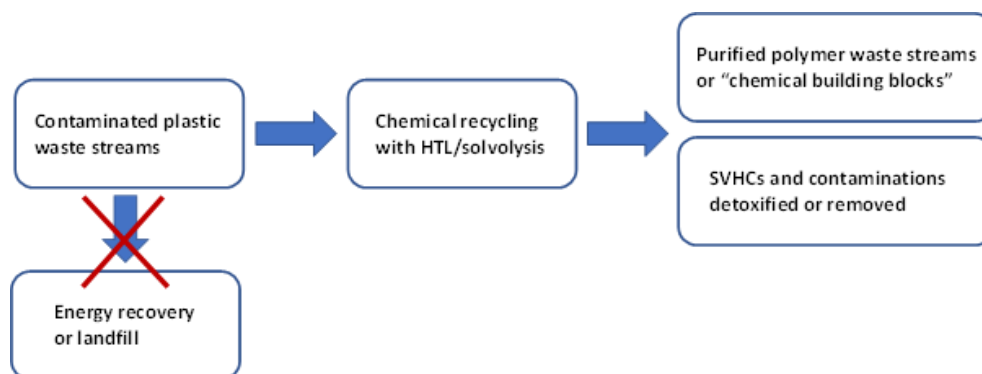


Figure 1: The concept of the DeToxoLys project research